Operation & Maintenance Manual

SEAM002800

LW250-3

ROUGH TERRAIN CRANE

SERIAL NUMBERS LW250 (H-Outrigger)-20001 and up
LW250 (X-Outrigger)-21001

⚠ WARNING

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

NOTICE

Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

KOMATSU

1. FOREWORD

SEAM002800

This manual provides rules and guidelines which will help you use this machine safely and effectively. Keep this manual handy and have all personnel read it periodically. If this manual has been lost or has become dirty and can not be read, request a replacement manual from Komatsu or your Komatsu distributor.

If you sell the machine, be sure to give this manual to the new owners.

Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

This manual may contain attachments and optional equipment that are not available in your area. Consult Komatsu or your Komatsu distributor for those items you may require.

⚠ WARNING

- **Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.**
- **Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.**
- **Some actions involved in operation and maintenance of the machine can cause a serious accident, if they are not done in a manner described in this manual.**
- **The procedures and precautions given in this manual apply only to intended uses of the machine. If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others. In no event should you or others engage in prohibited uses or actions as described in this manual.**
- **Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.**
- **The description of safety is given in SAFETY INFORMATION on page 0-2 and in SAFETY from page 1-1.**

2. SAFETY INFORMATION

Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the machine before performing operation and maintenance.

To identify safety messages in this manual and on machine labels, the following signal words are used.

⚠**DANGER** - **This word is used on safety messages and safety labels where there is a high probability of serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.**

⚠**WARNING** - **This word is used on safety messages and safety labels where there is a potentially dangerous situation which could result in serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.**

⚠**CAUTION** - **This word is used on safety messages and safety labels for hazards which could result in minor or moderate injury if the hazard is not avoided. This word might also be word for hazards where the only result could be damage to the machine.**

NOTICE - **This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.**

Safety precautions are described in SAFETY from page 1-1.

Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine. If you are unsure about the safety of some procedures, contact Komatsu distributor.

3. INTRODUCTION

3.1 FEATURES

Excellent productivity and
ease of operation: Use of 30.5 m boom and power tilt jib with maximum tilt angle of 60°
Superb mobility and
safety in travel: High output, high torque engine and mode selection type fully automatic transmission mounted
Pleasant operating
environment: Comfortable operator's cab with large operating space
Further improved ease of
entry into confined spaces: Addition of rear steering mode and small tail swing width
Safety ensured with
fail-proof of operations: O.S.S. system with automatic detection of outrigger width

3.2 BREAKING IN THE MACHINE

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break in the machine for the initial 100 hours (as indicated by the service meter.)
During breaking in:

- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

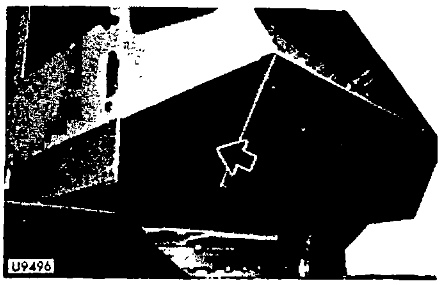
The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration of safety in such operations is the responsibility of the user.

Operations that are prohibited in this manual must never be carried out under any circumstances.

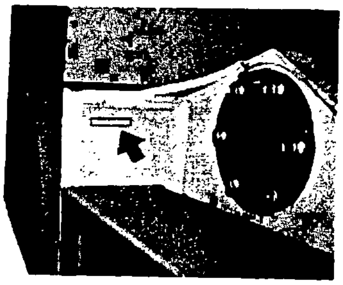
4. LOCATION OF PLATES, TABLE TO ENTER SERIAL NUMBER AND DISTRIBUTOR

4.1 MACHINE SERIAL NUMBER PLATE AND STAMP POSITION

The plate is on the right side face of the cab.



The stamp is on the rear right face of the chassis.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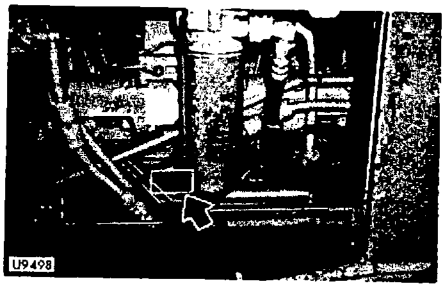
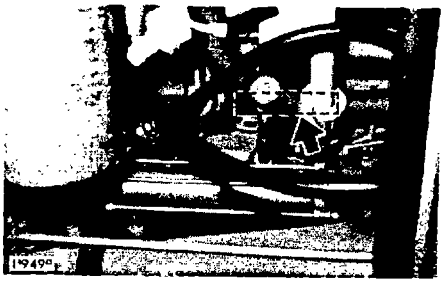
4.2 ENGINE SERIAL NUMBER PLATE AND STAMP POSITION

The plate is on the right side face of the engine cylinder block as seen from the fan.



The stamp is on the right side face of the engine cylinder block as seen from the fan.



4.3 TABLE TO ENTER SERIAL NUMBER AND DISTRIBUTOR

Machine serial No.:

Engine serial No.:

Distributor name:

Address:

Phone:

Service personnel for your machine:

5. CONTENTS

1. **Foreword** 0-1

2. **Safety information** 0-2

3. **Introduction** 0-3

4. **Location of plates, table to enter serial number and distributor** 0-4

SAFETY

6. **General precautions** 1- 2

7. **Precautions during operation** 1- 7
   - 7.1 Before starting engine 1- 7
   - 7.2 Operating machine 1- 9
   - 7.3 Precautions when traveling 1-11
   - 7.4 Precautions when using crane 1-14
   - 7.5 Battery 1-23
   - 7.6 Towing 1-24

8. **Precautions for maintenance** 1-25
   - 8.1 Before carring out maintenance 1-25
   - 8.2 During maintenance 1-27
   - 8.3 Tires 1-32

9. **Position for attaching safety labels** 1-34

OPERATION

10. **General locations** 2- 2
   - 10.1 General view of machine 2- 2
   - 10.2 General view of controls and gauges 2- 3

11. **Explanation of components** 2- 5
   - 11.1 Outline of inside of operator's compartment 2- 5
   - 11.2 Front panel group 2- 6
   - 11.3 Top panel group 2-26
   - 11.4 Side panel group 2-30
   - 11.5 Pedal group 2-42
   - 11.6 Left rear cover group 2-45
   - 11.7 External control group 2-46
   - 11.8 Tachograph 2-47
   - 11.9 Accelerator lever 2-47
   - 11.10 Outrigger control panel 2-47
   - 11.11 Operator's seat 2-47
   - 11.12 Steering wheel 2-48
   - 11.13 Assistant's seat 2-48
   - 11.14 Seat belt 2-48
   - 11.15 Fuse box 2-49
   - 11.16 Door open lock 2-51
   - 11.17 Car radio 2-52
   - 11.18 Car cooler 2-56
   - 11.19 Car heater 2-59
   - 11.20 OSS external pilot lamp (option) 2-62

12. Operation 2- 63
12.1 Check before starting engine 2- 63
12.2 Starting engine 2- 81
12.3 Operation, check after starting engine 2- 83
12.4 Preparations before moving machine off (when traveling on public roads) 2- 84
12.5 Moving machine off 2- 86
12.6 Shifting gear 2- 88
12.7 Traveling downhill 2- 89
12.8 Steering machine 2- 90
12.9 Stopping machine 2- 92
12.10 Traveling on rough ground 2- 93
12.11 Switching 4-wheel drive, Hi-Low (4-wheel drive lo) 2- 94
12.12 Special travel 2- 95
12.13 Switching between forward and reverse 2- 98
12.14 Precautions when traveling 2- 99
12.15 Precautions before crane operations 2-101
12.16 Outline of crane operations 2-102
12.17 Outrigger operations 2-103
12.18 When outriggers are not used (on-tire operations) 2-112
12.19 Main winch operations 2-115
12.20 Auxiliary winch operations 2-119
12.21 Boom hoist operations 2-123
12.22 Boom telescope operations 2-124
12.23 Boom telescope selector operation 2-125
12.24 Swing operations 2-126
12.25 Power tilt jib hoist operations 2-127
12.26 Adjusting operating speed 2-128
12.27 Precautions for operation 2-129
12.28 Parking machine 2-130
12.29 Check after finishing operation 2-131
12.30 Stopping engine 2-131
12.31 Check after stopping engine 2-132
12.32 Locking 2-132
12.33 Handling jib 2-133
12.34 Handling single top 2-147
12.35 Handling wire rope 2-150
12.36 Setting overload safety system (O.S.S.) 2-156

13. Cold weather operation 2-184
13.1 Precautions for low temperature 2-184
13.2 Precautions after completion of work 2-186
13.3 After cold weather 2-186

14. Long-term storage 2-187
14.1 Before storage 2-187
14.2 During storage 2-188
14.3 After storage 2-188

15. Troubleshooting 2-189
15.1 When machine runs out of fuel 2-189
15.2 Emergency travel operation 2-190
15.3 If battery is discharged 2-191
15.4 Other trouble 2-195

MAINTENANCE

16. Guides to maintenance 3- 2

17. Outlines of service 3- 5
  17.1 Outline of oil, fuel, coolant 3- 6
  17.2 Outline of electric system 3- 9

18. Wear parts list 3-10

19. Use of fuel, coolant and lubricants according to ambient temperature 3-11

20. Standard tightening torques for bolts and nuts 3-15
  20.1 Introduction of necessary tools 3-15
  20.2 Torque list 3-16

21. Periodic replacement of safety critical parts 3-17

22. Maintenance schedule chart 3-19
  22.1 Maintenance schedule chart 3-19

23. Service procedure 3-24
  23.1 Initial 250 hours service 3-24
  23.2 When required 3-25
  23.3 Check before starting 3-42
  23.4 Every 50 hours service 3-55
  23.5 Every 100 hours service 3-58
  23.6 Every 250 hours service 3-60
  23.7 Every 500 hours service 3-74
  23.8 Every 1000 hours service 3-79
  23.9 Every 2000 hours service 3-82
  23.10 Every 4000 hours service 3-89

SPECIFICATIONS

24. Specifications 4- 2

OPERATIONS WITH ATTACHMENTS

25. Operations with attachments 5- 2

26. Handling leader 5- 4

SAFETY

⚠ WARNING

Read and follow all safety precautions. Failure to do so may result in serious injury or death.

This safety section also contains precautions for optional equipment and attachments.

6. GENERAL PRECAUTIONS

⚠ WARNING: For reasons of safety, always follow these safety precautions.

SAFETY RULES

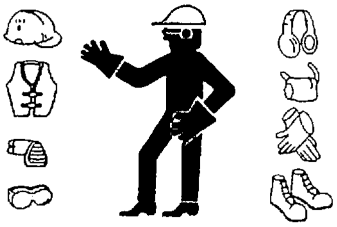
- ONLY trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- When working with another operator or a person on worksite traffic duty, be sure all personnel understand all hand signals that are to be used.
- Decide on one person who will give the signals. Using more than one person to give signals may actually increase the danger.

SAFETY FEATURES

- Be sure all guards and covers are in their proper position. Have guards and covers repaired if damaged.
- Make sure that you understand the use of safety devices such as the seat belt or lock pin of the winch clutch lever before you use them.
- Never remove any safety device under any circumstances. Take steps to ensure that the safety devices can always function properly.
  Lock pin of winch clutch lever → See "12.28 PARKING MACHINE".
  Seat belt → See "12.1.3 ADJUSTING BEFORE OPERATION".
- Mistaken use of the safety devices may lead to serious injury or death.
- Before using the seat belt, check that there is no abnormality. Replace the seat belt once every 3 years.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

- Avoid loose clothing, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death. Also, do not wear oily clothes because they are flammable.
- Wear a hard hat, safety glasses, safety shoes, mask or gloves when operating or maintaining the machine. Always wear safety goggles, hard hat and heavy gloves if your job involves scattering metal chips or minute materials - this is so particularly when driving pins with a hammer and when cleaning the air cleaner element with compressed air.
  Check also that there is no one near the machine.
  Cleaning of air cleaner element → See "23.2 WHEN REQUIRED" in service procedure.

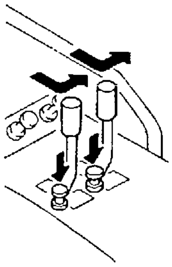


UNAUTHORIZED MODIFICATION

- Any modification made without authorization from Komatsu can create hazards.
- Before making a modification, consult your Komatsu distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modification.

ALWAYS APPLY LOCK WHEN STANDING UP FROM OPERATOR'S SEAT

- When standing up from the operator's seat, set the gear shift lever to the N position and turn the parking brake switch ON. If this is not done, the machine may move suddenly and cause serious injury or death.
- When leaving the machine, lower the load completely, place the gear shift lever at the N position, set the lock pin of the winch clutch lever to the LOCK position, then stop the engine. Always remove the key and take it with you.
  Posture of work equipment → See "12.28 PARKING MACHINE".

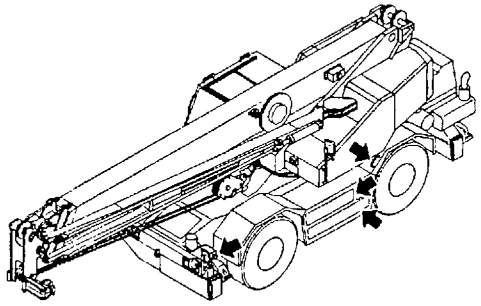


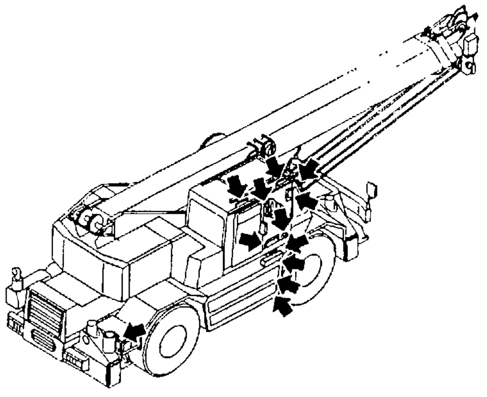
PRECAUTIONS AFTER ADJUSTING OPERATOR'S SEAT

- Check that you can operate the brakes, pedals, and levers properly.
- Install the seat belt securely.
  Seat belt → See "12.1.3 ADJUSTING BEFORE OPERATION".

MOUNTING AND DISMOUNTING

- NEVER jump on or off the machine. NEVER get on or off a moving machine.
- When getting on or off the machine, face the machine and use the handhold and steps.
- Never hold any control levers when getting on or off the machine.
- Always maintain three-point contact with the handholds and steps to ensure that you support yourself.
- If there is any oil, grease, or mud on the handholds or steps, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.

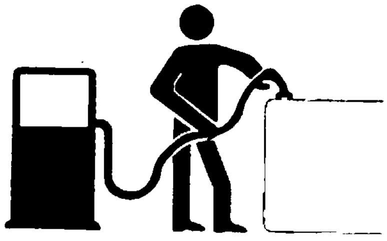


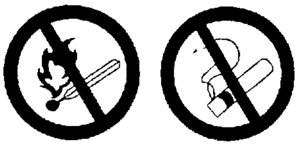


FIRE PREVENTION FOR FUEL AND OIL

Fuel, oil, and antifreeze can be ignited by a flame. Fuel is particularly FLAMMABLE and can be HAZARDOUS.

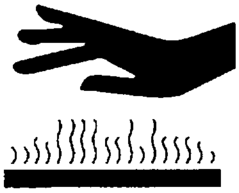
- Keep a flame away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil caps securely.
- Refueling and oiling should be made in well ventilated areas.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.





PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURES

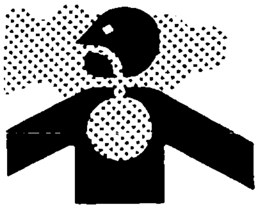
- Immediately after operations are stopped, the engine coolant, engine oil, and hydraulic oil are at high temperatures, and are still under pressure. Attempting to remove the cap, drain the oil or water, or replace the filters may lead to serious burns. Always wait for the temperature to go down, and follow the specified procedures when carrying out these operations.
- Before removing the radiator cap, stop the engine and let the radiator cool. Turn the cap slowly to release the internal pressure before removing the cap.
- The hydraulic tank is not pressurized, but if the breather (cap) is clogged, pressure may build up inside the tank. As a result, oil may spurt out when the hydraulic tank cap is removed. Always turn the cap slowly to release the internal pressure before removing the cap.



ASBESTOS DUST HAZARD PREVENTION

Asbestos dust can be HAZARDOUS to your health if it is inhaled.
If you handle materials containing asbestos fibers, follow these guidelines as given below:

- NEVER use compressed air for cleaning.
- Use water for cleaning to keep down the dust.
- Operate the machine with the wind to your back, whenever possible.
- Use an approved respirator if necessary.

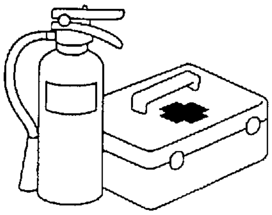


CRUSHING OR CUTTING PREVENTION

- Do not enter, or put your hand or arm or any other part of your body between movable parts such as between the work equipment and cylinders, or between the machine and work equipment. If the work equipment is operated, the clearance will change and this may lead to serious damage or personal injury.

FIRE EXTINGUISHER AND FIRST AID KIT

- Be sure fire extinguishers have been provided and know how to use them.
- Provide a first aid kit at the storage point.
- Know what to do in the event of a fire.
- Be sure you know the phone numbers of persons you should contact in case of an emergency.



PRECAUTIONS FOR ATTACHMENTS

- When installing and using an optional attachment, read the instruction manual for the attachment and the information related to attachments in this manual.
- Do not use attachments that are not authorized by Komatsu or your Komatsu distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the machine.
- Any injuries, accidents, product failures resulting from the use of unauthorized attachments will not be the responsibility of Komatsu.

7. PRECAUTIONS DURING OPERATION

⚠ WARNING: Failure to follow these safety precautions may lead to a serious accident.

7.1 BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.
- Check the condition of the road surface at the worksite, and determine the best and safest method of operation.
- Select a ground surface that is as hard and horizontal as possible when carrying out operations.
- If you need to operate on a street, protect pedestrians and cars by designating a person for worksite traffic duty or by installing fences around the worksite.
- Check the depth and flow of water before operating in water or crossing a river. NEVER be in water which is in excess of the permissible water depth.
- The operator himself must carry out the final visual check to confirm the operating position, route, and existence of any obstacles before starting operations.

FIRE PREVENTION

- Thoroughly remove wood chips, leaves, paper and other flammable things accumulated on the engine compartment. They could cause a fire.

- Check fuel, lubrication, and hydraulic systems for leaks. Have any leaks repaired. Wipe up any excess oil, fuel or other flammable fluids.
  Check point → See "12.1.1 WALK-AROUND CHECK".

- Be sure a fire extinguisher is present and working.

IN OPERATOR'S CAB

- Do not leave tools or spare parts lying around in the operator's compartment. They may damage or break the control levers or switches. Always put them in the tool box on the right side of the machine.

- Keep the cab floor, controls, steps and handrails free of oil, grease, snow, and excess dirt.

- Check the seat belt, buckle and hardware for damage or wear. Replace any worn or damaged parts. Always use seat belts when operating your machine.
  Seat belts → See "12.1.3 ADJUSTING BEFORE OPERATION".

VENTILATION FOR ENCLOSED AREAS

- If it is necessary to start the engine within an enclosed area, provide adequate ventilation. Exhaust fumes from the engine can KILL.

PRECAUTIONS FOR MIRRORS, WINDOWS AND LIGHTS

- Remove all dirt from the surface of the windows and lights to ensure that you can see well.
- Adjust the side mirror so that you can see clearly from the operator's seat, and always keep the surface of the mirror clean. If any glass is broken, replace it with a new part.
- Check that the head lamps and working lamps are installed to match the operating conditions. Check also that they light up properly.

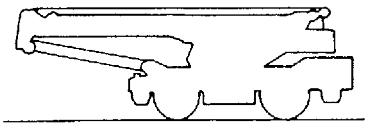
7.2 OPERATING MACHINE

WHEN STARTING ENGINE

- Walk around your machine again just before mounting it, checking for people and objects that might be in the way.
- NEVER start the engine if a warning tag has been attached to the control.
- When starting the engine, sound the horn as an alert.
- Start and operate the machine only while seated.

CHECK DIRECTION BEFORE STARTING MACHINE

Before driving the machine, always check the direction of the chassis frame.
Procedure when traveling → See "12.5 MOVING MACHINE OFF".



CHECK FOR ABNORMALITIES

If there is any abnormal noise, vibration, heat, or smell, or any abnormality in the operation of the gauges, or if there is leakage of air, oil, or fuel, move the machine immediately to a safe place, and repair the problem.

TEST DRIVE BEFORE TRAVELING

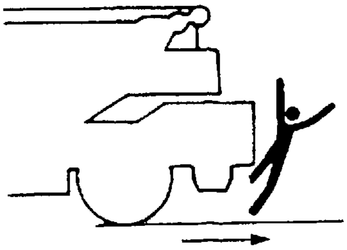
Test drive the machine at a safe place to check that the travel condition (travel speed, forward and reverse travel, operation of steering, braking effect) is normal before starting operations.

CHECK WHEN SWINGING OR TRAVELING IN REVERSE

Before operating the machine or work equipment, do as follows.

- Sound the horn to warn people in the area.
- Check that there is no one near the machine. Be particularly careful to check behind the machine.
- If necessary, designate a person to check the safety. This is particularly necessary when traveling in reverse.
- When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Ensure that no unauthorized person can come within the turning radius or direction of travel. If necessary, put up fences.

The above precautions must be followed at all times even when using machines equipped with a backup alarm or mirror.



DO NOT HIT WORK EQUIPMENT

- When working in places where there are height limits, such as in tunnels, under bridges, under electric cables, or in garages, be extremely careful not to hit the boom or arm.

AVOID CONTACT

- When working in confined spaces or inside buildings, be careful not to hit anything around or above the machine.

ENSURE GOOD VISIBILITY

- When working in dark places, install working lamps and head lamps, and set up lighting in the work area if necessary.
- Stop operations if the visibility is poor, such as in mist, snow, or rain, and wait for the weather to improve to a condition that allows the operation to be carried out safely.

WORKING ON SNOW

- Snow-covered and frozen ground may cause the machine to slip sideways, even if the grade is not steep. Slow down the machine when traveling on such ground, and avoid sudden starting, stopping, and steering.
  In addition, fit chains to the rear wheels, and use the 4-wheel drive for traveling.

WORKING ON LOOSE GROUND

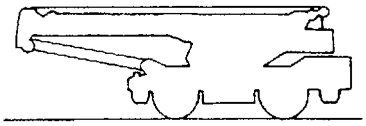
- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse, your machine could fall or tip over and result in serious injury or death. Remember that the soil after heavy rain or blasting is weakened in these areas.
- Earth laid on the ground and the soil near ditches are loose. They can collapse under the weight or vibration of your machine.
- Before traveling across bridges or over other structures, check first that the structure can support the weight of the machine.

PRECAUTIONS IN COLD AREAS

- Check the operation of the safety devices, switches, and sensors, and remove snow or carry out defrosting if necessary.
- Remove the snow and carry out the defrosting of the swing circle, outriggers, boom, and winch, and check that these parts move properly before starting operations.
- Always drain the water from the air tank.
- When operating the service brake or parking brake, if there is no sound of air escaping, check the pressure in the air tank and remove the snow or carry out the defrosting of the area around the brake valve.
- Warm up the engine properly before starting operations. Do not raise the engine speed immediately after starting the engine.
- Check that the winch brake and clutch work properly.

7.3 PRECAUTIONS WHEN TRAVELING

SET TO TRAVEL POSTURE



- Set the work equipment to the travel posture shown in the diagram on the right before traveling.
- Stow the boom and hook in the specified position.
- Place all control levers at the neutral position.
- Stow the outriggers.
  Check that the outrigger EXTEND/STOW selector switch is at neutral, and that the outrigger switch pilot lamp is off.
- Set the steering mode switch to the " " position and set to front 2-wheel steering.
- Set the swing lock lever to the LOCK position.
- When swinging, set the boom angle so that the boom does not contact the mirror or other parts.

PRECAUTIONS BEFORE TRAVELING

- Check that the air pressure gauge reading is 5 – 10 kg/cm² (71 – 142 psi).
- Always be aware of the condition of the brake wear.
- Check that all the monitor lamps are working normally.
- Check the operation and lighting up of the brake lamp.
- Check that the working lamp is not on.
  If you drive on roads with the working lamp on, this will cause problems for other traffic.
  It is prohibited to travel on roads with the working lamp on.
- On public roads, it is prohibited to use 4-wheel steering.
- On public roads, do not use 4-wheel drive unless there are special conditions (the road is covered with snow). Using the 4-wheel drive will cause premature wear of the tires.
- Always keep the door of the operator's cab closed.
  If you travel with the door open, there is danger that the door may come out of the detent or suddenly slam shut if the brakes are applied suddenly or if the machine goes down a steep hill.

PRECAUTIONS WHEN TRAVELING

- When traveling on uneven ground, slow down the machine and avoid sudden movement of the steering.
- Avoid riding over obstacles as much as possible. If you must ride over obstacles, travel at low speed. Never travel over obstacles which cause the machine to tilt excessively (more than 10°). Riding over such large obstacles could cause the machine to tip over on its side.
- Never turn the key in the starting switch to the OFF position when traveling.
- If the engine should stall while the machine is traveling, the steering wheel will become heavy. Move the machine immediately to a safe position and stop the machine.
- If the reverse steering switch is turned ON when the machine is traveling forward, the direction of turning will be the reverse of the direction of operation of the steering wheel, so never touch the reverse steering switch when traveling.
- Always stop the machine before switching between 2-wheel drive and 4-wheel drive.
- Always keep the door of the operator's cab closed when traveling.

TRAVELING ON SLOPES

- Traveling on slopes could result in the machine tipping over or slipping.
  Method of traveling on slopes → See "12.14 PRECAUTIONS WHEN TRAVELING".
- Do not travel on grass, fallen leaves, or wet steel plates. Even slight slopes may cause the machine to slip to the side, so travel at low speed and make sure that the machine is always traveling directly up or down the slope.
- When traveling down slopes, shift the gear shift lever to (2) or (L) to match the grade. Use the braking force of the engine together with the exhaust brake and retarder brake (option) to control the machine speed.

LEAVE SPACE WHEN STOPPING

To prevent the front of the machine from crossing the stop line, always leave a space when stopping.

PARKING MACHINE

- Park on level ground whenever possible. If the machine must be stopped on a slope, block the wheels to prevent the machine from moving.
- When parking on public roads, park the machine so that the machine, flags, and fences do not obstruct traffic, and provide fences, signs, flags, or lights, and put up any other necessary signs to ensure that passing traffic can see the machine clearly.
  Parking procedure → See "12.28 PARKING MACHINE".
- Before leaving the machine, lower the work equipment securely to the specified position, set the gear shift lever to the N position, and the work equipment control levers to the HOLD position, then stop the engine. Always remove the key and take it with you.
  Work equipment posture → See "12.28 PARKING MACHINE".
  Locks → See "12.32 LOCKING".
- Always close the door of the operator's cab.

7.4 PRECAUTIONS WHEN USING CRANE

7.4.1 GENERAL PRECAUTIONS

LIFTING LONG OBJECTS

It is dangerous to lift long objects because the load is unstable. When lifting such loads, attach guide ropes to both ends of the load to improve the stability.

BENDING OF BOOM

When a load is lifted, the boom will bend, and this will increase the working radius. Always take this into account when carrying out lifting operations.

CHANGES IN TEMPERATURE

When the temperature changes, the volume of the hydraulic oil in the cylinders will also change. Therefore, if operations are carried out when the hydraulic oil is at a high temperature, the oil temperature will drop as time passes, and the volume of the hydraulic oil will be reduced. As a result, the boom will move down or will be retracted, so operate the lever to compensate for this.

CHECK WEATHER REPORT

- If there is lightning, stop operating the crane and stow the boom.
- If there are gusts of wind exceeding 10 m/s, stop the crane operation and stow the boom (jib). Retract the boom fully, then lower it and apply the swing lock securely.
- Even when the maximum wind speed is less than 10 m/s, the larger the load, the higher the load is lifted, and the longer the boom (jib) is, the greater theeffect of the wind.
  When using the long boom, the wire rope on the winch and the electric signal cables will also be blown by the wind.
  Furthermore, when working near tall buildings, the wind tends to be funneled between the buildings, and this may increase the wind speed.
- When raising roads with a large wind-contact area, such as steel plates, there is danger that the wind from the front, rear, and side of the boom (jib) may damage the boom (jib) or cause the machine to overturn, so be extremely careful when carrying out such operations.
- When a load is not being lifted, there is danger that wind from the front of the boom may cause the machine to tip over to the rear, so be extremely careful when carrying out such operations.

KEEP CLEAR OF HIGH VOLTAGE POWER LINES

Precautions when working near power lines

- If you approach a high-voltage power line, there is danger of electric shock. Take the following preventive action.

  1) Always maintain the following safe distances between the machine and the power line.

Voltage of power line	Minimum safe distance	
6.6 kV	3 m	10 ft
33.0 kV	4 m	14 ft
66.0 kV	5 m	17 ft
154.0 kV	8 m	27 ft
275.0 kV	10 m	33 ft

  2) Take preventive steps beforehand, such as fitting covering tubes to the power line, or attaching warning messages, or positioning workers to observe safety.
  3) Wear shoes with rubber or leather soles.
     Contact the electric power company to confirm the voltage in the power lines at the worksite.

- Contact the electric power confirm to the voltage in the power lines at the worksite.

- When carrying out operations near high-voltage power lines, do not allow anyone to approach the machine.

Action when coming into contact with power line

If the machine comes into contact with the power line, and becomes charged with electricity, rushing to leave the operator's compartment will only increase the danger. You will not suffer electric shock if you stay in the operator's seat.

First, remain calm. Then do the following.

- Contact
  Contact the power company or company in charge of the power line and have them stop the power or take other emergency action.

- Move all workers away from the crane
  Move all workers away from the crane to prevent any secondary disaster.
  The crane is charged with the electricity, so if any other worker is holding the winch rope or guide rope and suffers electric shock, get him to escape under his own power. Do not try to help him. This will only lead to more people being electrocuted.

- Emergency action
  If any workers are electrocuted when the crane contacts the power line, take the following action.
  1) Operate the crane to remove the structural parts of the crane from the area in contact with the power line. Carry out this operation carefully, because there is danger of cutting the power line.
  2) Remove the crane completely from the cause of the electrical contact, check that the crane is no longer live, then rescue the electrocuted worker and take him to hospital immediately.

KEEP CLEAR OF HIGH VOLTAGE POWER LINES (continued)

- Method of escape for crane operator in emergencies
  The safest procedure for the crane operator is to stay in the operator's compartment until the power company has stopped the flow of electricity through the wires which the crane has contacted. If this is impossible, operate the crane to move the structural parts of the crane away from the contact with the power line, then escape from the operator's compartment.
  If the crane is in any of the conditions listed below, get out of the operator's compartment and jump off as far as possible away from the machine. When you land, make sure that no part of your body touches the machine. It is extremely dangerous to touch the machine, as you will be electrocuted.

1) The engine does not work.
2) The crane has been damaged and does not move.
3) The power line has been cut and cannot be removed from the crane.
4) Other emergencies.

- If such an accident happens, always have the crane inspected by a specialist before using it again.

Precautions when operating crane near high-power transmitters
When operating the crane near high-power transmitters, such as radar, or television or radio transmission antennas, there is danger that the structural parts of the crane will attract the electric waves and generate inductive current. There is also danger that the mechatronics systems may be damaged or adversely affected.

USE ONLY FOR SPECIFIED PURPOSE

Never use the crane to raise or lower workers.

OPERATE CRANE SLOWLY

Operate the crane slowly until you become accustomed to it.

DO NOT HANDLE CRANE ROUGHLY

Do not operate the levers or accelerators suddenly. In particular when swinging, always operate at low speed.

DO NOT ALLOW PEOPLE INSIDE WORKING RADIUS

Never allow anyone to come inside the working radius.

CHECK SAFETY BEFORE OPERATING PTO

Before operating the PTO, check that the lever and pedals are at the neutral position, and that they are locked.

DO NOT LEAVE OPERATOR'S SEAT

Do not leave the operator's seat with a load still raised.

WIND IN HOOK WHEN NOT USING

Wind in the hook when you are not using it.

DO NOT USE MACHINE BEYOND CAPACITY

Carrying out operations that exceed the capacity of the machine will lead to accident or failure. In particular, with crane operations, always keep to the load given in the rated overall load table.

BE READY TO OPERATE BRAKE WHEN USING FREE FALL

Do not remove your foot from the winch brake pedal during free-fall operations.

DO NOT STRAIN WIRE WHEN WINDING IN

Be careful not to let the wire catch on trees or metal structures when carrying out operations. If the wire gets caught, do not continue to wind in. Free the wire, then continue the winding-in operation.

IT IS PROHIBITED TO PULL IN LOADS OR TO PULL LOADS SIDEWAYS OR VERTICALLY

Do not pull the load in or pull it sideways or vertically. The load will sway; this is dangerous and may damage the machine.

7.4.2 PRECAUTIONS FOR CRANE OPERATIONS

CHECK CRANE BEFORE STARTING

Check that the safety devices and crane work properly before starting.

- Operate each control lever, pedal, and switch without using a load and check that they work properly. Repair any abnormality immediately.
- Check that the overload safety system (OSS) works properly.

PRECAUTIONS WHEN SELECTING POSITION FOR CRANE

Always set the crane on horizontal firm ground. It is dangerous to set the crane in the following places.

- Simple asphalt paved surfaces
- Thin concrete paved surfaces
- Stone pavement
- Places where water has got under the paved surface and created holes; where the surface looks hard but the soil inside is soft
- Places close to the road shoulder or holes dug in the road

When working on slopes, make the surface horizontal.
If the crane is not placed on a horizontal surface and lifting operations are carried out with the machine at an angle, the OSS will not work properly, the machine may overturn, unexpected force may be brought to bear on the machine, or the machine may be damaged.

STABILITY OF CRANE

The stability of a crane is determined in the side direction. The stability in a diagonal direction is greater, but if the rated load is exceeded during operations, the boom and chassis may be damaged. Even in the diagonal direction, the OSS must not be turned off.

PRECAUTIONS WHEN SETTING CRANE

- Apply the parking brake.
- Always extend the outriggers to the MAX, MID, or MIN position.
- Each outrigger can be extended individually to the MAX, MID, or MIN position.The outrigger setting for the OSS (overload safety system) can also be set individually on the left and right, but it cannot be set at the front or rear.
  If the extension width of the front and rear outriggers is different on the left and right sides, set the OSS outrigger set switch to the smaller outrigger extension width.
  The machine may overturn, so it is extremely dangerous if this setting is mistaken.
- Depending on the way in which the outrigger is extended (MIN, stationary lifting), even when there is no load, the OSS may detect an overload and sound the alarm depending on the swing position of the boom.
  In such cases, retract or raise the boom to escape from the danger range, then reconsider the safety of the posture or position for the crane operation.
- When setting the crane in a place where the ground is considered to be soft, always take suitable action, such as putting wooden blocks under the jack feet tomatch the conditions, and always maintain a horizontal firm surface. On soft or uneven ground, the wooden blocks may break.
- After setting the crane, check that the tires have come off the ground surface, then use a spirit level to check that the machine is horizontal.
- When using the outriggers and lifting with the boom to the side, the machine will overturn if the outriggers are moved.
  Method of setting outriggers → See "12.36.6 METHOD OF SETTING FUNCTION AND OSS".

PRECAUTIONS DURING OPERATION

- Do not cancel the operation stop condition and continue work.
- Always pay attention to the overload safety system (OSS) display and alarm when carrying out operations.

HANDLING WIRE ROPE

Always use leather gloves when handling the wire rope.
Never use wire rope in the following condition.

- Wire rope where more than 10% of the wires in one strand (excluding filler wires) are broken.
- Wire rope where the wear diameter exceeds 7% of the nominal diameter.
- Wire rope with kinks.
- Wire rope with marked loss of shape or corrosion.

PRECAUTIONS WHEN OPERATING WINCH

- Select a hook that matches the weight of the load and a suitable number of loops of wire rope to match the length of the boom.
  Fitting wire rope → See "12.35 HANDLING WIRE ROPE".
- Never let anyone go under a raised load.
- When carrying out lifting operations, stop at the point where the load leaves the ground, then check that it is safe before continuing the lifting operation.
- Do not pull the load sideways, or pull it in, or raise at an angle.
- It is dangerous to operate the clutch lever during winch operations, so do not operate it.
- It is prohibited to carry out free-fall operation with a raised load.
- If the wire rope is twisted and the hook rotates, remove the twisting before continuing the operation.
  Method of removing twisting from wire rope → See "12.35 HANDLING WIRE ROPE".
- Except when carrying out free-fall operations, set the clutch lever to the ON position and lock it with the lock pin.
- When winding out, always leave at least 3 loops of wire rope on the drum.

PRECAUTIONS WHEN RAISING OR LOWERING BOOM

- Do not raise or lower the boom suddenly.
- It is prohibited to pull loads in or up by raising the boom.

PRECAUTIONS WHEN TELESCOPING BOOM

- When retracting or extending the boom, check the operation of the winch.
- Do not operate the lever suddenly.

PRECAUTIONS WHEN SWINGING

- Apply the swing brake when not carrying out swing operations.
- When swinging from the side where the outriggers are extended further to the side where the outriggers are extended less, the machine may overturn even when no load is raised, so always pay careful attention to the direction of swing and the setting of the outriggers.
- It is prohibited to pull loads in or up using the swing operation.

HANDLING JIB

- Select a suitable position for the OSS working mode setting switch that matches the operating condition of the jib.
- It is prohibited to carry out free-fall operation with a raised load.

7.4.3 PRECAUTIONS FOR SPECIAL CRANE OPERATIONS

PRECAUTIONS WHEN LIFTING WITH TWO CRANES

- Both cranes should be the same model.
- Select a crane model that gives ample margin for the load being lifted.
- Always designate one person to give signals.
- It is a basic rule to operate only the crane. Do not carry out swing operations.

CRANE OPERATION AT WORKSITES RAISING LOAD FROM BELOW GROUND

- Select a model which has ample winch wire.
- As far as possible, set the crane in a position where the outriggers can be extended to the maximum width.
- Always observe the signals.
- Be particularly careful when operating the crane.
- When winding out, always leave at least 3 loops of wire rope on the drum.
- It is prohibited to use free-fall operations.

LIFTING OPERATIONS USING HOOKS OF BOTH JIB AND BOOM

- Carry out the crane operation in accordance with the rated overall load for the jib.
- Select a suitable position for the OSS working mode setting switch that matches the operating condition of the jib.
- Distribute the weight of the load between the main hook and jib hook so that there is no excessive load on the jib.
- This operation will create an error in the load gauge display.

STATIONARY LIFTING OPERATIONS

- There is a big difference in the rated overall load depending on the working range. In particular, do not carry out swing operations.
- Set the OSS outrigger set switch to the ON-TIRE position.
- Check the tire inflation pressure, and if it is below the specified pressure (784.53 kPa (8.00 kg/cm^2, 113.60 psi)), add air to the tires.
- It is prohibited to carry out free-fall operations oroperations which will exceed the specified jib and boom length.
- Set the machine on horizontal firm ground when carryingout stationary lifting operations.
- Use only over-front lifting for stationary lifting operations. If swing operations are used, the machine will tip over.

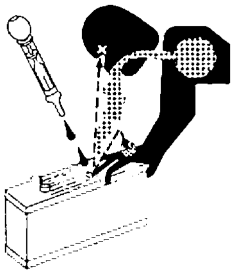
TRAVELING WITH RAISED LOAD

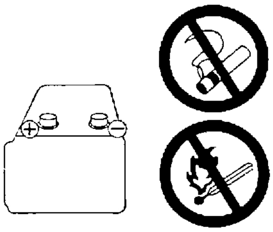
- Do not operate the swing when traveling with a raised load.
- Always follow the precautions given in the operation manual.
  → **See "12.18 WHEN OUTRIGGERS ARE NOT USED".**
- Make sure that the load is well within the capacity of the crane and keep the load just clear of the ground.
- Set the OSS outrigger set switch to the ON-TIRE position.
- Always carry out the operation with the work equipment in the specified posture.
- Position signalmen when carrying out travel operations.
- Remove all obstacles from the travel path, and do not let anyone enter the area.
- It is prohibited to operate the crane when traveling with a raised load.
- It is prohibited to carry out free-fall operations or operations which will exceed the specified jib and boom length.
- Check the tire inflation pressure, and if it is below the specified pressure (784.53 kPa (8.00 kg/cm^2, 113.60 psi)), add air to the tires.
- The rated overall load is the load under the best conditions, so operate with a load that is safe for the operating conditions.
- Consider the ground conditions and operating conditions, and travel with a raised load only in places where it is judged to be safe.
- When traveling with a raised load, travel at a maximum speed of 1.6 km/h, and avoid sudden starting, stopping, gear shifting, or any other operation during travel which will cause the load to sway.
  Travel at a low speed and take action to prevent the load from swaying.
- When traveling with a raised load, apply the swing brake.

7.5 BATTERY

BATTERY HAZARD PREVENTION

- Battery electrolyte contains sulfuric acid and can quickly burn the skin and eat holes in clothing. If you spill acid on yourself, immediately flush the area with water.
- Battery acid could cause blindness if splashed into the eyes. If acid gets into the eyes, flush them immediately with large quantities of water and see a doctor at once.
- If you accidentally drink acid, drink a large quantity of water or milk, beaten egg or vegetable oil. Call a doctor or poison prevention center immediately.
- When working with batteries. ALWAYS wear safety glasses or goggles.
- Batteries generate hydrogen gas. Hydrogen gas is very EXPLOSIVE, and is easily ignited with a small spark or flame.
- Before working with batteries, stop the engine and turn the starting switch to the OFF position.
- Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals.
- When removing or installing, check which is the positive (+) terminal and engative (–) terminal.
- Tighten the battery terminals securely. Loosened terminals can generate sparks and lead to an explosion.



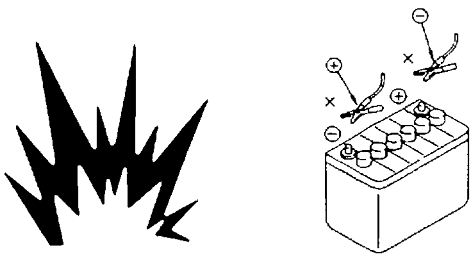


STARTING WITH BOOSTER CABLES

- ALWAYS wear safety glasses or goggles when starting the machine with booster cables.
- When starting from another machine, do not allow the two machines to touch.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the ground or negative (–) cable first when removing them.
- If any tool touches between the positive (+) terminal and the chassis, it will cause sparks. This is dangerous, so be sure to work carefully.
- Connect the batteries in parallel: positive to positive and negative to negative.

Starting with booster cables → See "15. TROUBLESHOOTING".

INCORRECT



7.6 TOWING

WHEN TOWING, ATTACH WIRE TO FRAME

- Injury or death could result if a disabled machine is towed incorrectly.
- If your machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity.
- NEVER allow a disabled machine to be towed on a slope.
- Do not use a kinked or frayed wire rope.
- Do not straddle the towing cable or wire rope.
- When connecting up a towing machine, do not let anyone enter the area between the towing machine and the equipment being towed.
- Set the towing machine and the towing connection of the equipment being towed in a straight line when connecting it.

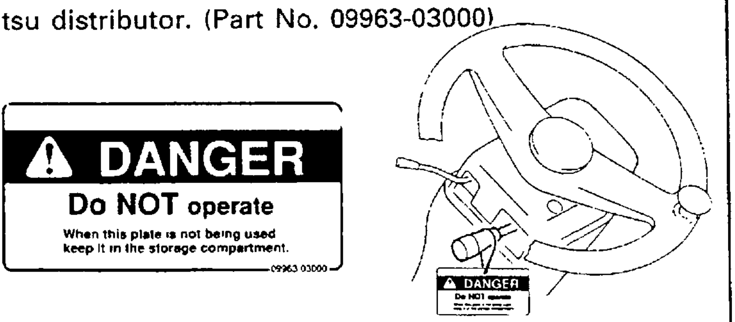
8. PRECAUTIONS FOR MAINTENANCE

⚠ WARNING: Failure to follow these safety precautions may lead to a serious accident.

8.1 BEFORE CARRYING OUT MAINTENANCE

WARNING TAG

- If others start the engine or operate the controls while you are performing service or lubrication, you could suffer serious injury or death.
- ALWAYS attach the WARNING TAG to the control lever in the operator's cab to alert others that you are working on the machine. Attach additional warning tags around the machine, if necessary.
- These tags are available from your Komatsu distributor. (Part No. 09963-03000)


⚠ DANGER
Do NOT operate
When this plate is not being used keep it in the storage compartment.
09963 03000
⚠ DANGER
Do NOT

PROPER TOOLS

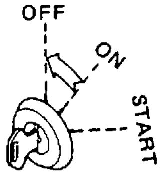
- Use only tools suited to the task. Using damaged, low quality, faulty, or makeshift tools could cause personal injury.
  Tools → See "20.1 INTRODUCTION OF NECESSARY TOOLS".

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- Replace the following fire-related components periodically:
  Fuel system: Fuel hose, spilling hose, and fuel tube cap
  Hydraulic system: Pump outlet hose, and front and rear pump branch hoses
- Replace these components periodically with new ones, regardless of whether or not they appear to be defective. These components deteriorate over time.
- Replace or repair any such components if any defect is found, even though they have not reached the time specified.
  Replacement of safety critical components → See "21. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS".

STOP THE ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- Always stop the machine on firm flat ground and stop the engine before carrying out inspection and maintenance.
- If it is necessary to run the engine when carrying out maintenance, such as when cleaning the inside of the radiator, apply the locks to the work equipment control levers, and always carry out the operations with two workers.
- One worker should sit in the operator's seat so that he can stop the engine immediately if necessary. He should also be extremely careful not to touch any lever by mistake. Touch the levers only when they have to be operated.
- The worker carrying out the maintenance should be extremely careful not to touch or get caught in the moving parts.



8.2 DURING MAINTENANCE

PERSONNEL

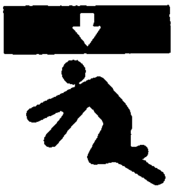
- Only authorized personnel can service and repair the machine. Extra precaution should be used when grinding, welding, and using a sledge-hammer.

ATTACHMENTS

- Place attachments that have been removed from the machine in a safe place so that they do not fall. If they fall on you or others, serious injury could result.

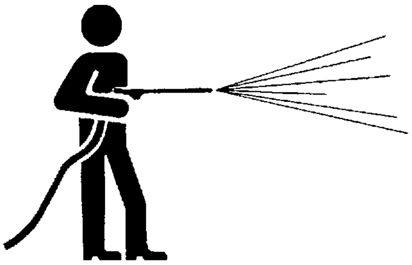
WORK UNDER THE MACHINE

- Always lower all movable work equipment to the ground or to their lowest position before performing service or repairs under the machine.
- Extend the outriggers and position them securely before carrying out work under the machine.



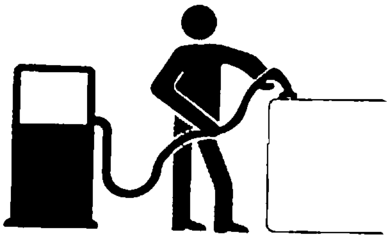
KEEP THE MACHINE CLEAN

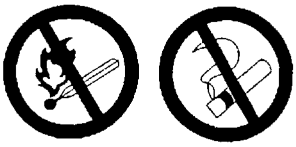
- Spilled oil or grease, or scattered tools or broken pieces are dangerous because they may cause you to slip or trip.
  Always keep your machine clean and tidy.
- If water gets into the electrical system, there is danger that the machine may not move or may move unexpectedly.
  Do not use water or steam to clean the sensors, connectors, or the inside of the operator's compartment.



RULES TO FOLLOW WHEN ADDING FUEL OR OIL

- Spilled fuel and oil may cause you to slip, so always wipe it up immediately.
- Always tighten the cap of the fuel and oil fillers securely.
- Never use fuel for washing any parts.
- Always add fuel and oil in a well-ventilated place.



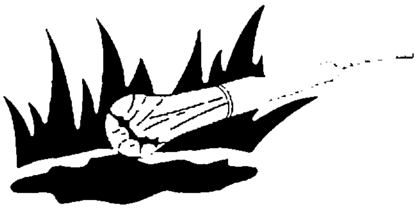


RADIATOR WATER LEVEL

- If it is necessary to add water to the radiator, stop the engine and wait for the engine and radiator to cool down before adding water.
- When adding water, remove the cap from the sub-tank and add water to the specified level.
- When checking the water level, wait for the engine to cool down, then check the sub-tank.

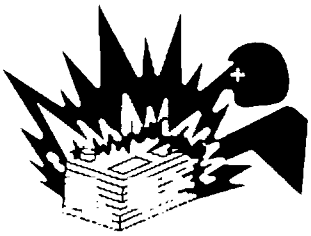
USE OF LIGHTING

- When checking fuel, oil, coolant, or battery electrolyte, always use lighting with anti-explosion specifications.
  If such lighting equipment is not used, there is danger of explosion.



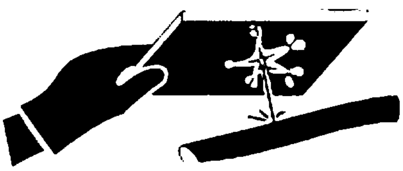
PRECAUTIONS WITH BATTERY

- When repairing the electrical system or when carrying out electrical welding, remove the negative (–) terminal of the battery to stop the flow of current.



· PRECAUTIONS WITH HIGH PRESSURE OIL

- Do not forget that the work equipment circuits are always under pressure.
- Do not add oil, drain oil, or carry out maintenance or inspection before completely releasing the internal pressure.
- If oil is leaking under high pressure from small holes, it is dangerous if the jet of high-pressure oil hits your skin or enters your eyes. Always wear safety glasses and thick gloves, and use a piece of cardboard or a sheet of wood to check for oil leakage.
- If you are hit by a jet of high-pressure oil, consult a doctor immediately for medical attention.



PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE OR HIGH PRESSURE

- Immediately after stopping operations, the engine cooling water and oil at all parts is at high temperature and under high pressure.
  In this condition, if the cap is removed, or the oil or water are drained, or the filters are replaced, this may result in burns or other injury. Wait for the temperature to go down, then carry out the inspection and maintenance in accordance with the procedures given in this manual.

Cleaning inside or cooling system → see "23.2 WHEN REQUIRED".

Checking cooling water level, hydraulic oil level → see "23.3 CHECK BEFORE STARTING".

Checking lubricating oil level, adding oil → see "23.3 CHECK BEFORE STARTING".

Checking transmission oil level, add oil → see "23.4 EVERY 50 HOURES SERVICE".

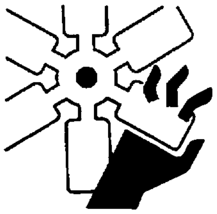
Changing oil, replacing filters → see "23.6 - 9 PERIODIC MAINTENANCE".

HANDLING HIGH-PRESSURE HOSES

- Do not bend high-pressure hoses or hit them with hard objects. Do not use any bent or cracked piping, tubes or hoses. They may burst during use.
- Always repair any loose or broken fuel hoses or oil hoses. If fuel or oil leaks, it may cause a fire.

ROTATING FAN AND BELT

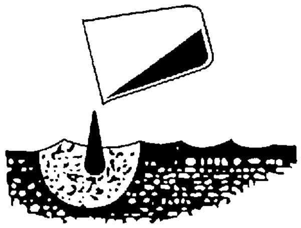
- Keep away from rotating parts and be careful not to let anything get caught in them.
- If your body or tools touch the fan blades or fan belt, they may be cut off or sent flying, so never touch any rotating parts.



WASTE MATERIALS

- Never dump waste oil in a sewer system, rivers, etc.
- Always put oil drained from your machine in containers. Never drain oil directly on the ground.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, batteries, and others.

INCORRECT



8.3 TIRES

HANDLING TIRES

If tires are not used under the specified conditions, they may overheat and burst or be cut and burst by sharp stones on rough road surfaces. This may lead toserious injury or damage.
To maintain safety, always keep to the following conditions.

- In flate the tires to the specified pressure. Abnormal heat is generated particularly when the inflation pressure is too low.
  Suitable inflation pressure → See "23.3.8 CHECK TIRE INFLATION PRESSURE".
- Avoid overloading.
- Use the specified tires.

The values given in this manual for the tire inflation pressure and permissible speed are general values. The actual values may differ depending on the type of tire and the condition under which they are used. For details, please contact your Komatsu distributor or tire maker.

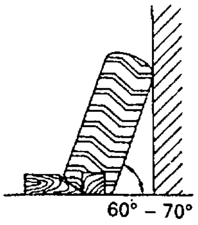
If the tire is heated when installed to the wheel, flammable gas is produced. If this catches fire, the tire may explode and cause serious injury or damage. Unlike when atire is punctured and burst, if a tire explodes, it produces a highly destructive force, so the following operations are strictly prohibited when the tireisinstalled to the wheel.

- Welding of the rim
- Lighting fires or carrying out welding operations near the wheel or tire

If you do not understand the proper procedure for carrying out maintenance or replacement of the wheel or tire, and you use the wrong method, the wheel or tire mayburst and cause serious injury or damage. When carrying out such maintenance, please consult your Komatsu distributor or tire maker.

STORING TIRES AFTER REMOVAL

- As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If the tires are stored outside, always erect a fence around the tiresand put up "No Entry" and other warning signs that even young children can understand.
- Stand the tire on level ground, and block it securely so that it cannot roll or fall over.
- If the tire should fall over, get out of the way quickly. The tires for construction equipment are extremely heavy, so trying to hold the tire may lead toserious injury.



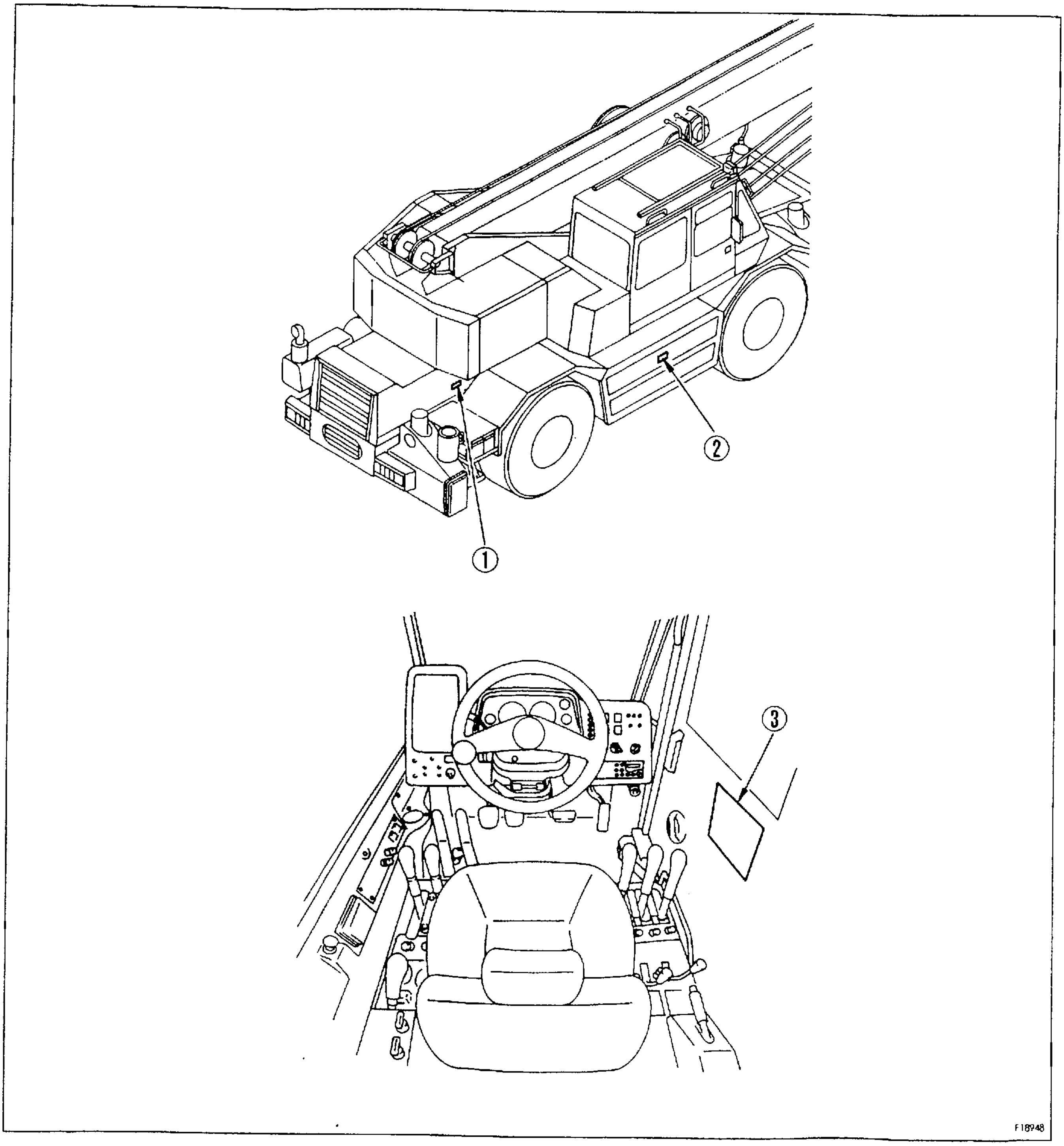
9. POSITION FOR ATTACHING SAFETY LABELS

Always keep these labels clean. If they are lost or damage, attach them again or replace them with a new label.

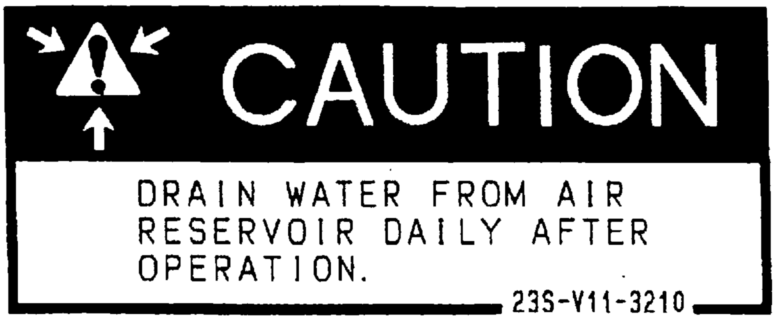
There are other labels in addition to the safety labels listed as follows, so handle them in the same way.

Safety labels may be available in languages other than English. To find out what labels are available, contact your Komatsu distributor.

POSITION FOR ATTACHING SAFETY LABELS



1. Precautions after finishing operations (23S-V11-3210)

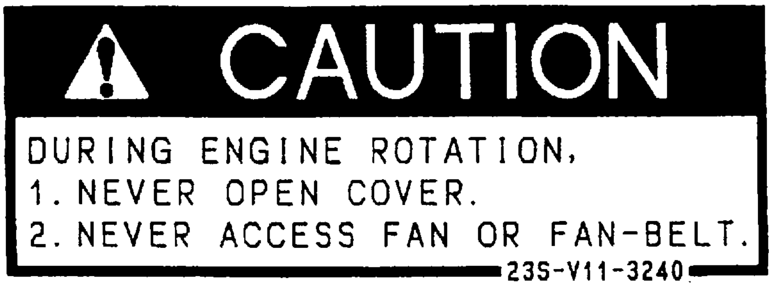


CAUTION

DRAIN WATER FROM AIR RESERVOIR DAILY AFTER OPERATION.

23S-V11-3210

2. Precautions while engine is running (23S-V11-3240)

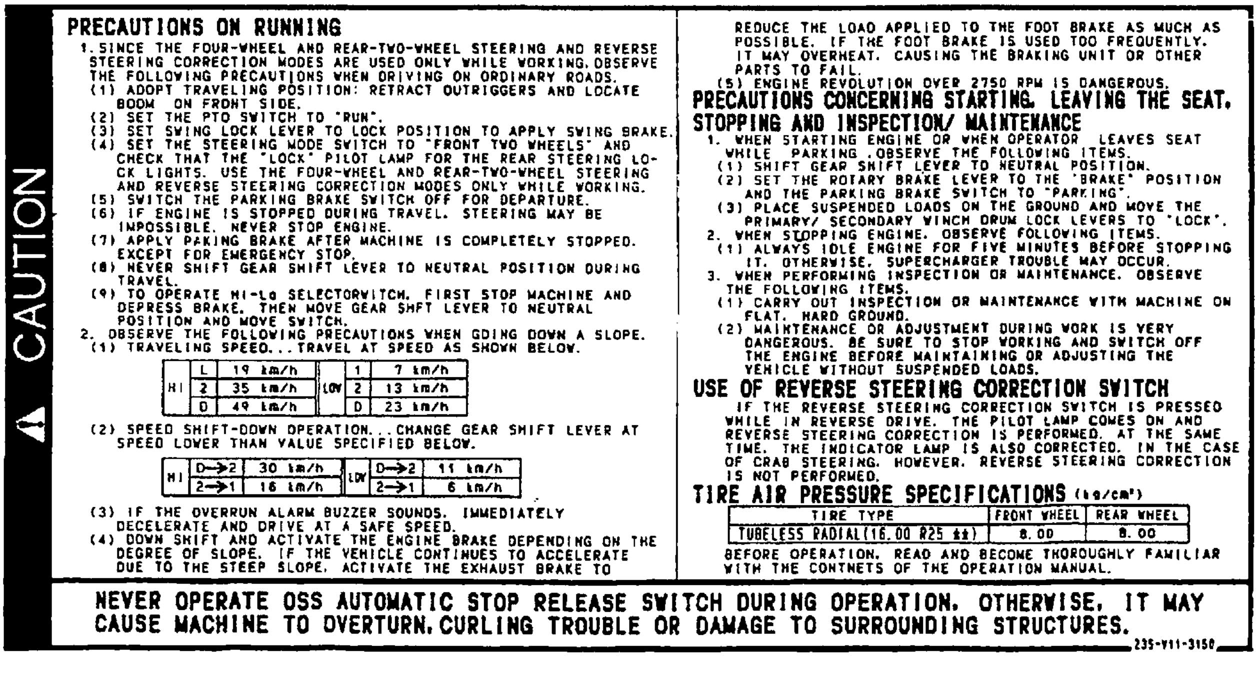


CAUTION

DURING ENGINE ROTATION,
1. NEVER OPEN COVER.
2. NEVER ACCESS FAN OR FAN-BELT.

23S-V11-3240

3. Precautions for operation (23S-V11-3150)



CAUTION

PRECAUTIONS ON RUNNING

1. SINCE THE FOUR-WHEEL AND REAR-TWO-WHEEL STEERING AND REVERSE STEERING CORRECTION MODES ARE USED ONLY WHILE WORKING. OBSERVE THE FOLLOWING PRECAUTIONS WHEN DRIVING ON ORDINARY ROADS.
   - (1) ADOPT TRAVELING POSITION: RETRACT OUTRIGGERS AND LOCATE BOOM ON FRONT SIDE.
   - (2) SET THE PTO SWITCH TO "RUN".
   - (3) SET SWING LOCK LEVER TO LOCK POSITION TO APPLY SWING BRAKE.
   - (4) SET THE STEERING MODE SWITCH TO "FRONT TWO WHEELS" AND CHECK THAT THE "LOCK" PILOT LAMP FOR THE REAR STEERING LOCK LIGHTS. USE THE FOUR-WHEEL AND REAR-TWO-WHEEL STEERING AND REVERSE STEERING CORRECTION MODES ONLY WHILE WORKING.
   - (5) SWITCH THE PARKING BRAKE SWITCH OFF FOR DEPARTURE.
   - (6) IF ENGINE IS STOPPED DURING TRAVEL. STEERING MAY BE IMPOSSIBLE. NEVER STOP ENGINE.
   - (7) APPLY PAKING BRAKE AFTER MACHINE IS COMPLETELY STOPPED. EXCEPT FOR EMERGENCY STOP.
   - (8) NEVER SHIFT GEAR SHIFT LEVER TO NEUTRAL POSITION DURING TRAVEL.
   - (9) TO OPERATE HI-Lo SELECTORWITCH. FIRST STOP MACHINE AND DEPRESS BRAKE. THEN MOVE GEAR SHFT LEVER TO NEUTRAL POSITION AND MOVE SWITCH.
2. OBSERVE THE FOLLOWING PRECAUTIONS WHEN GOING DOWN A SLOPE.
   - (1) TRAVELING SPEED...TRAVEL AT SPEED AS SHOWN BELOW.

HI	L	19 km/h	LOW	1	7 km/h
	2	35 km/h		2	13 km/h
	D	49 km/h		D	23 km/h

   - (2) SPEED SHIFT-DOWN OPERATION...CHANGE GEAR SHIFT LEVER AT SPEED LOWER THAN VALUE SPECIFIED BELOW.

HI	D→2	30 km/h	LOW	D→2	11 km/h
	2→1	16 km/h		2→1	6 km/h

   - (3) IF THE OVERRUN ALARM BUZZER SOUNDS. IMMEDIATELY DECELERATE AND DRIVE AT A SAFE SPEED.
   - (4) DOWN SHIFT AND ACTIVATE THE ENGINE BRAKE DEPENDING ON THE DEGREE OF SLOPE. IF THE VEHICLE CONTINUES TO ACCELERATE DUE TO THE STEEP SLOPE. ACTIVATE THE EXHAUST BRAKE TO REDUCE THE LOAD APPLIED TO THE FOOT BRAKE AS MUCH AS POSSIBLE. IF THE FOOT BRAKE IS USED TOO FREQUENTLY. IT MAY OVERHEAT. CAUSING THE BRAKING UNIT OR OTHER PARTS TO FAIL.
   - (5) ENGINE REVOLUTION OVER 2750 RPM IS DANGEROUS.

PRECAUTIONS CONCERNING STARTING. LEAVING THE SEAT. STOPPING AND INSPECTION/ MAINTENANCE

1. WHEN STARTING ENGINE OR WHEN OPERATOR LEAVES SEAT WHILE PARKING. OBSERVE THE FOLLOWING ITEMS.
   - (1) SHIFT GEAR SHIFT LEVER TO NEUTRAL POSITION.
   - (2) SET THE ROTARY BRAKE LEVER TO THE "BRAKE" POSITION AND THE PARKING BRAKE SWITCH TO "PARKING".
   - (3) PLACE SUSPENDED LOADS ON THE GROUND AND MOVE THE PRIMARY/ SECONDARY WINCH DRUM LOCK LEVERS TO "LOCK".
2. WHEN STOPPING ENGINE. OBSERVE FOLLOWING ITEMS.
   - (1) ALWAYS IDLE ENGINE FOR FIVE MINUTES BEFORE STOPPING IT. OTHERWISE. SUPERCHARGER TROUBLE MAY OCCUR.
3. WHEN PERFORMING INSPECTION OR MAINTENANCE. OBSERVE THE FOLLOWING ITEMS.
   - (1) CARRY OUT INSPECTION OR MAINTENANCE WITH MACHINE ON FLAT. HARD GROUND.
   - (2) MAINTENANCE OR ADJUSTMENT DURING WORK IS VERY DANGEROUS. BE SURE TO STOP WORKING AND SWITCH OFF THE ENGINE BEFORE MAINTAINING OR ADJUSTING THE VEHICLE WITHOUT SUSPENDED LOADS.

USE OF REVERSE STEERING CORRECTION SWITCH

IF THE REVERSE STEERING CORRECTION SWITCH IS PRESSED WHILE IN REVERSE DRIVE. THE PILOT LAMP COMES ON AND REVERSE STEERING CORRECTION IS PERFORMED. AT THE SAME TIME. THE INDICATOR LAMP IS ALSO CORRECTED. IN THE CASE OF CRAB STEERING. HOWEVER. REVERSE STEERING CORRECTION IS NOT PERFORMED.

TIRE AIR PRESSURE SPECIFICATIONS (kg/cm^2)

TIRE TYPE	FRONT WHEEL	REAR WHEEL
TUBELESS RADIAL(16.00 R25 ★★)	8.00	8.00

BEFORE OPERATION. READ AND BECOME THOROUGHLY FAMILIAR WITH THE CONTNETS OF THE OPERATION MANUAL.

NEVER OPERATE OSS AUTOMATIC STOP RELEASE SWITCH DURING OPERATION. OTHERWISE. IT MAY CAUSE MACHINE TO OVERTURN. CURLING TROUBLE OR DAMAGE TO SURROUNDING STRUCTURES.

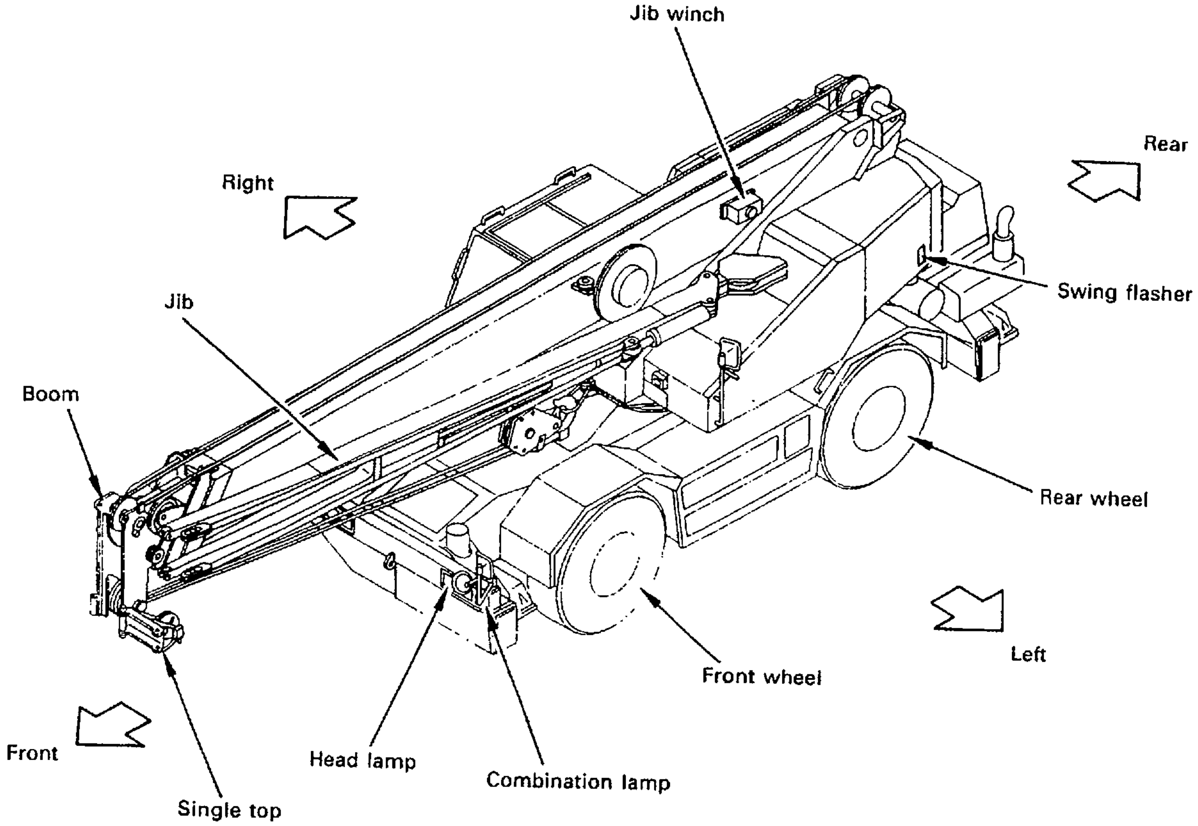
23S-V11-3150

OPERATION

10. GENERAL LOCATIONS

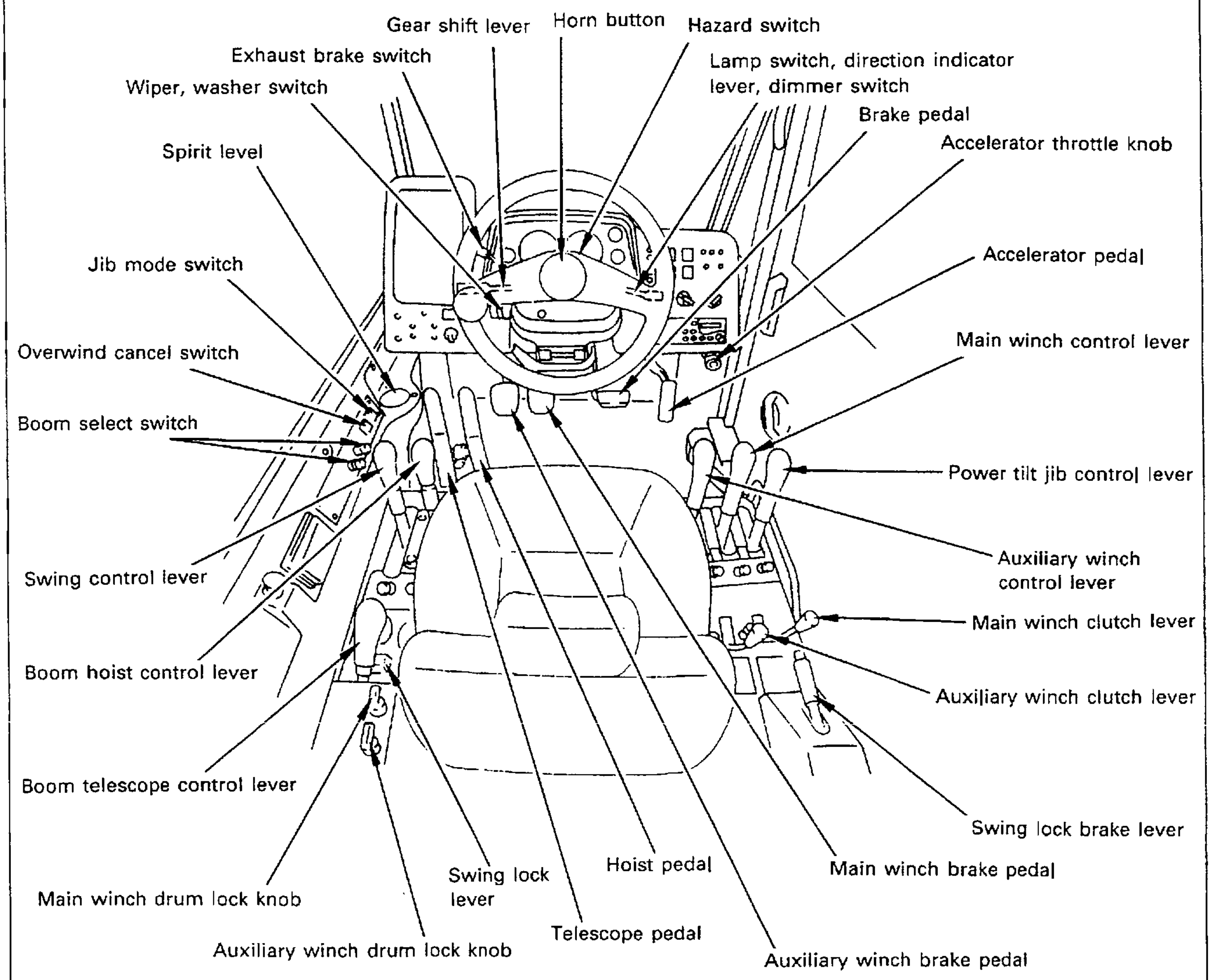
10.1 GENERAL VIEW OF MACHINE

If directions are indicated in this section, they refer to the directions shown by the arrows in the diagram below.

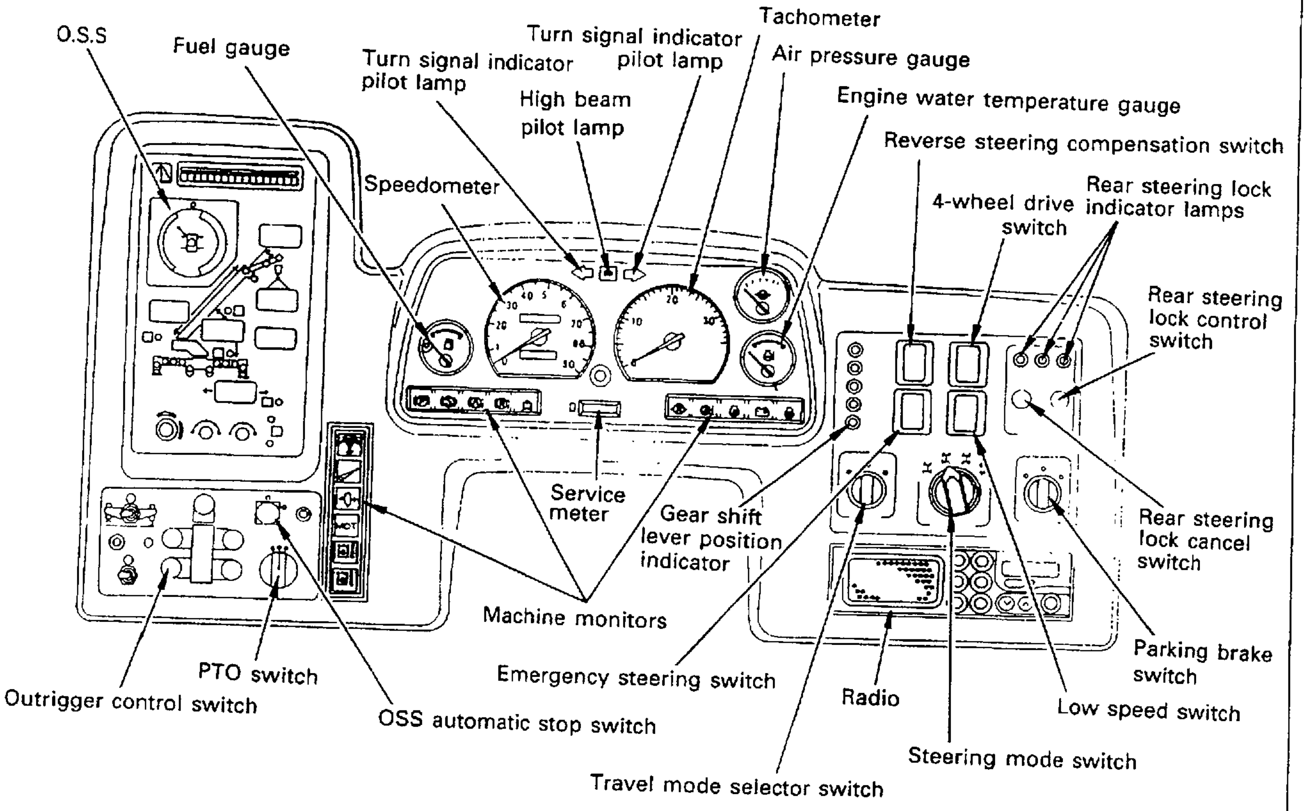


10.2 GENERAL VIEW OF CONTROLS AND GAUGES

10.2.1 GENERAL VIEW OF OPERATOR'S COMPARTMENT



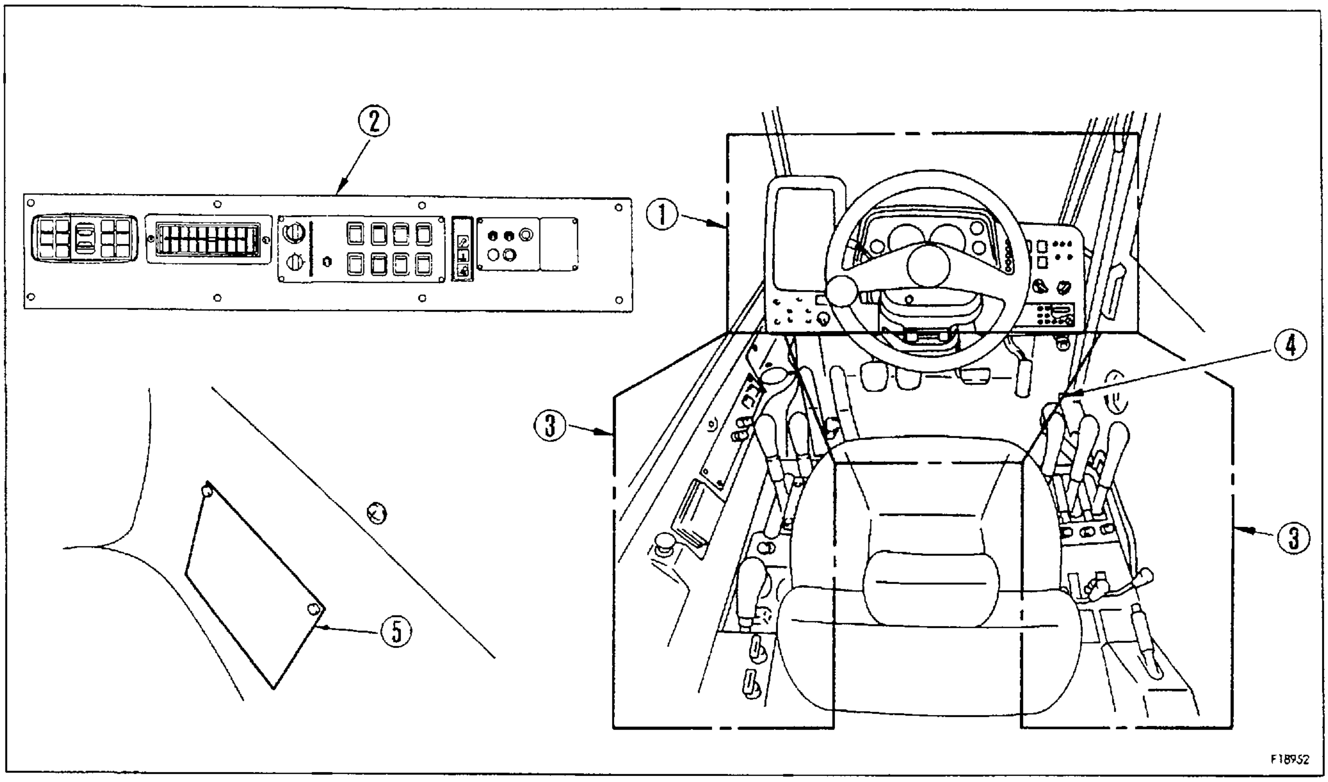
10.2.2 FRONT PANEL


O.S.S
Fuel gauge
Turn signal indicator pilot lamp
Turn signal indicator pilot lamp
High beam pilot lamp
Tachometer
Air pressure gauge
Engine water temperature gauge
Reverse steering compensation switch
Speedometer
4-wheel drive switch
Rear steering lock indicator lamps
Rear steering lock control switch
Service meter
Gear shift lever position indicator
Rear steering lock cancel switch
Machine monitors
Parking brake switch
PTO switch
Outrigger control switch
OSS automatic stop switch
Emergency steering switch
Radio
Low speed switch
Steering mode switch
Travel mode selector switch
F1895.

11. EXPLANATION OF COMPONENTS

The following is an explanation of devices needed for operating the machine.
To carry out suitable operations correctly and safely, it is important to understand fully the methods of operating the equipment and the meanings of the displays.

11.1 OUTLINE OF INSIDE OF OPERATOR'S COMPARTMENT



The controls inside the operator's compartment consist of the following five groups.

1. **FRONT PANEL GROUP**
   This includes the monitors, OSS, meters, car radio, and switches.

2. **TOP PANEL GROUP**
   This includes the heater switch, pilot lamps, and cooler switch.

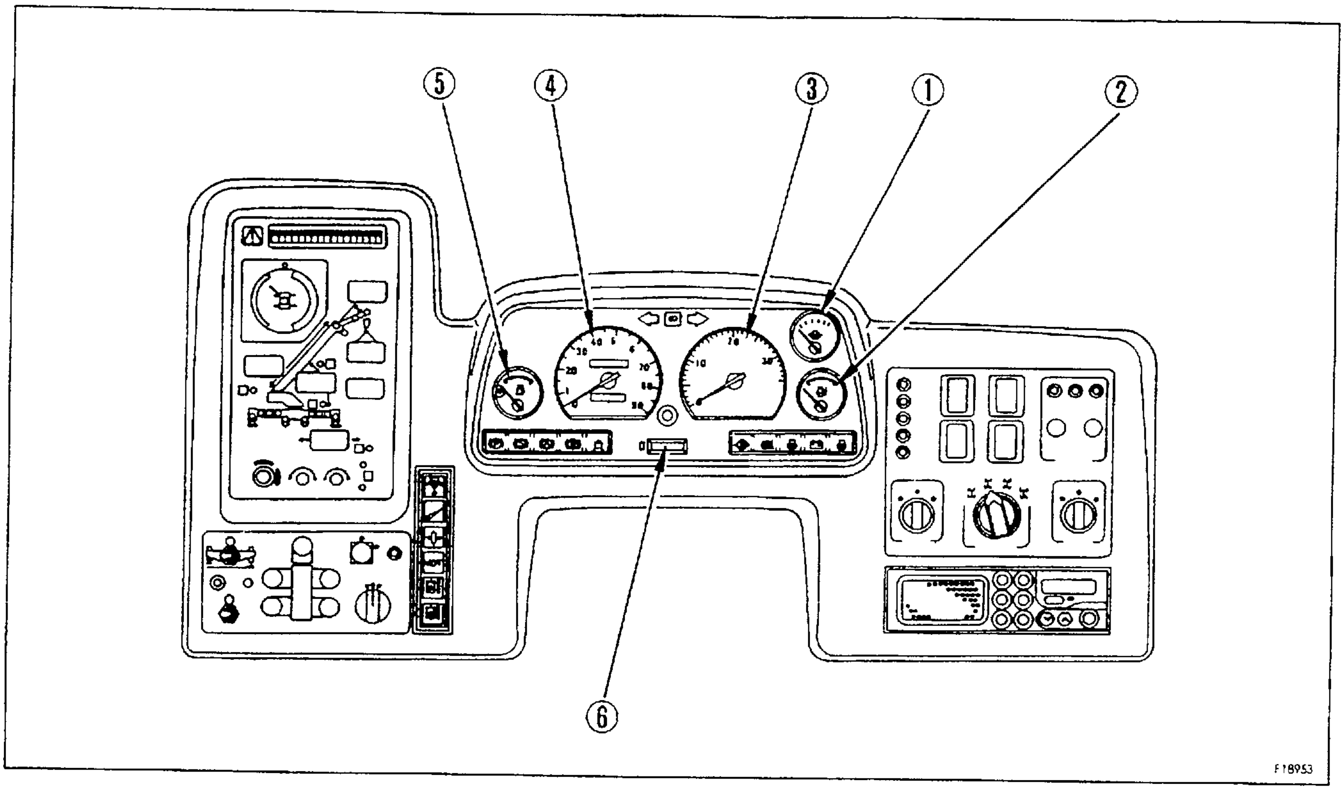
3. **SIDE PANEL GROUP**
   This includes the work equipment control levers, gear shift lever, and spirit level.

4. **PEDAL GROUP**
   This consists of the brake pedal, accelerator pedal, winch pedals, and work equipment pedals.

5. **LEFT REAR COVER GROUP (FUSE INSPECTION COVER)**
   This includes the emergency gear shift selector switch, the emergency gear shift switch, and fuses.

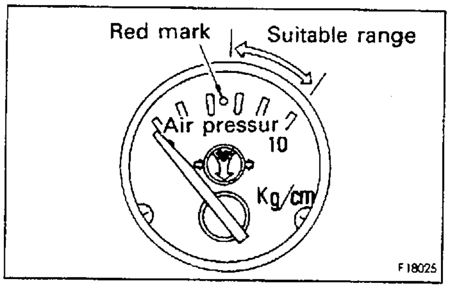
11.2 FRONT PANEL GROUP

11.2.1 METERS



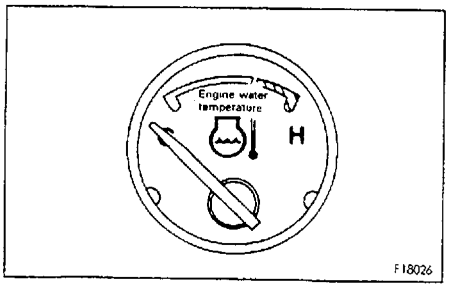
1. AIR PRESSURE GAUGE

This indicates the air pressure inside the air tank.
When the indicator is in the range indicated by the arrow during operation, the air pressure is normal.
If the air pressure is below the range indicated by the arrow during operation, an alarm buzzer will sound, and the air tank pressure monitor lamp will light up. If this happens, stop the machine, run at high idling, and wait for the indicator to enter the range indicated by the arrow.



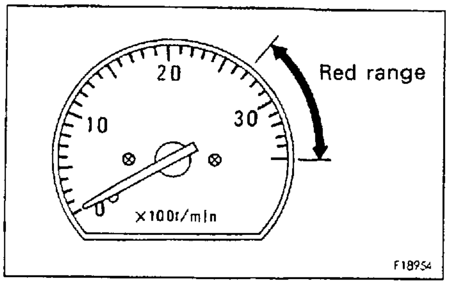
2. ENGINE WATER TEMPERATURE GAUGE

This gauge indicates the cooling water temperature.
When the indicator is in the white range during operations, the water temperature is normal. If the indicator moves into the red range during operation, stop the engine, run the engine at low idling, and wait for the indicator to go back to the white range.



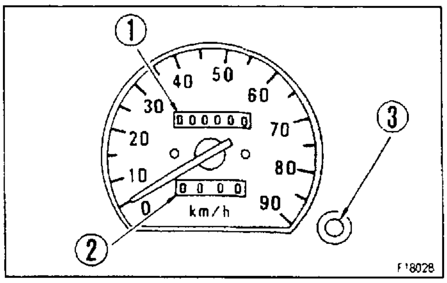
3. TACHOMETER

This indicates the number of revolutions of the engine per minute.
Red range: This indicates that the engine is overrunning.
White range: This is the normal range for use.



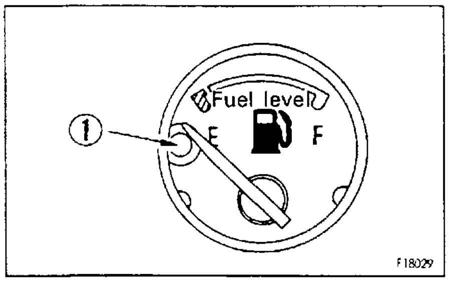
4. SPEEDOMETER

This indicates the speed at which the machine is traveling.
The speedometer includes an odometer ① and trip meter ②.
Odometer ① indicates the total distance traveled by the machine in kilometers.
Trip meter ② can be used if you want to know the distance traveled over a certain stretch or period of time. The white numerals show kilometers, and the black numeral shows 100 meters.
Press reset button ③ to return the meter reading to 0.



5. FUEL GAUGE

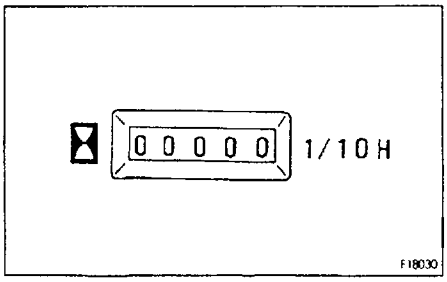
This indicates the amount of fuel remaining in the fuel tank.
E: Empty
F: Full
If fuel warning lamp ① lights up during operations, check the fuel level and add fuel as soon as possible.



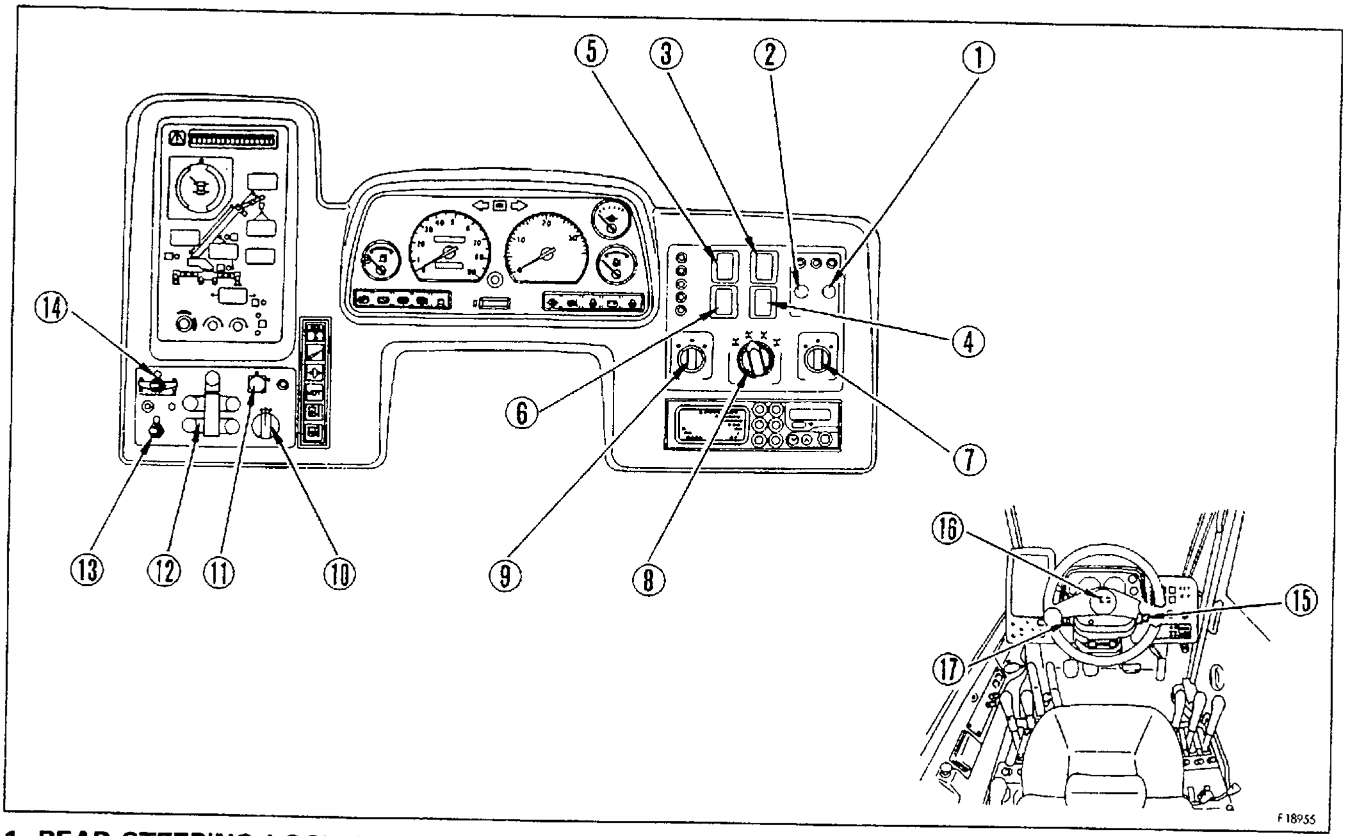
6. SERVICE METER

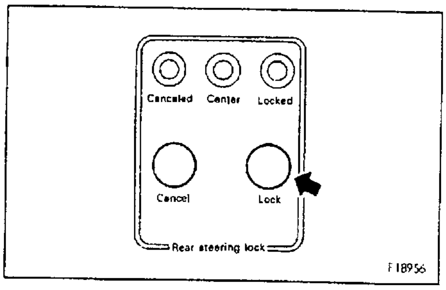
This shows the total number of hours that the machine has worked.
Use this display to set the interval for periodic maintenance.
The service meter advances while the engine is running even if the machine is not moving.
The meter show the hours and the black numeral shows 1/10 hours.

The white numeral will advance by 1 for every hour that the engine is running, regardless of the engine speed.



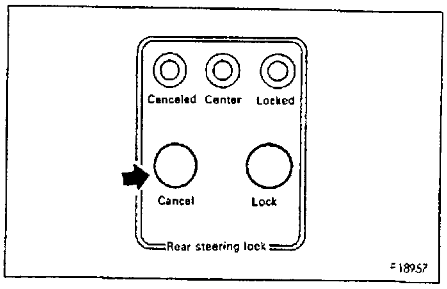
11.2.2 SWITCHES





1. REAR STEERING LOCK CONTROL SWITCH

For general travel operations, lock the rear wheel steering device mechanically.
When the switch is pressed, the lock pin goes down and the rear steering is locked.

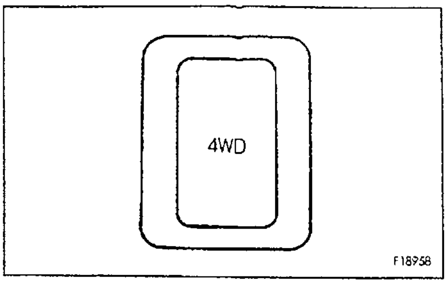


2. REAR STEERING LOCK CANCEL SWITCH

When this switch is pressed, the lock pin moves up and the lock is released.

REMARK

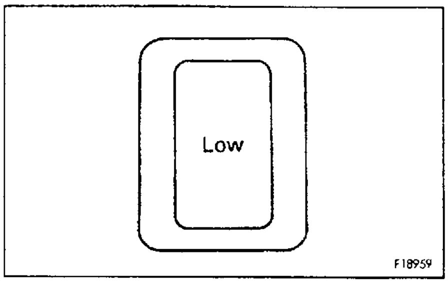
Before operating switches 1 or 2, set the steering mode switch to the "Front 2-wheel drive" position.
The lock switch is actuated only when the center (yellow) indicator lamp for the rear steering lock is lighted up.



3. 4-WHEEL DRIVE SWITCH

When this switch is pressed, the drive is switched from 2- wheel drive to 4-wheel drive (torque converter). When the switch is pressed again, it returns to 2-wheel drive.
Use this switch when traveling on soft ground or snow- covered roads in urban areas.

When the switch is ON, the pilot lamp (white) inside the switch lights up. When the night lighting is switched on, the switch lights up green when it is OFF.



4. LOW SPEED SWITCH

WARNING

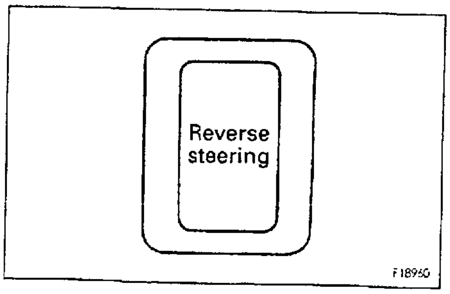
Stop the machine and set the gear shift lever to the N position, then depress the brake when operating the low speed switch. Failure to follow the above operation will lead to breakage of the transmission select gear, so be extremely careful to follow the procedure correctly.

When this switch is pressed, it switches from high speed to low speed (torque converter). When the switch is pressed again, it returns to high speed.
Use this switch when traveling on steep hills, rough ground, or soft ground.

When the switch is ON, the pilot lamp (white) inside the switch lights up. When the night lighting is switched on, the switch lights up green when it is OFF.

When traveling with a raised load, set to the low speed position.

5. REVERSE STEERING COMPENSATION SWITCH



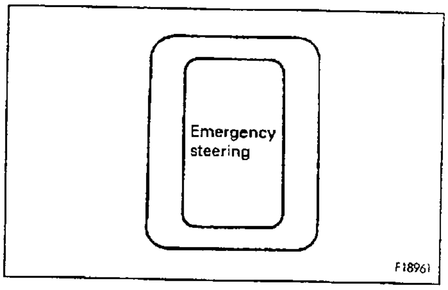
⚠ WARNING

- **When traveling on general roads, never touch the reverse steering switch under any circumstances. Turning the switch ON when traveling is extremely dangerous because the direction of operation of the steering wheel becomes the reverse of the direction of movement of the machine.**
- **It is prohibited to travel on public roads while using reverse steering.**

When the upper structure is turned to face the rear, use the compensation to prevent the steering from being reversed.
When the cover is opened and the switch is pressed, the reverse steering compensation mechanism is actuated. When the switch is pressed again, it returns to the original setting.

When the switch is ON, the pilot lamp (red) inside the switch lights up. When the night lighting is switched on, the switch lights up green when it is OFF.

6. EMERGENCY STEERING SWITCH

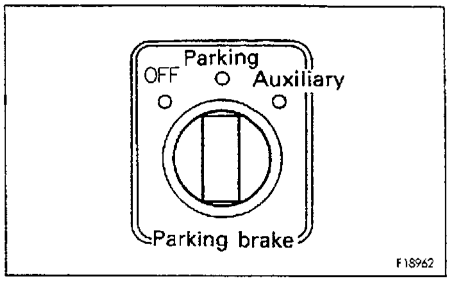


This switch actuates the emergency steering pump.
When the switch is pressed, the emergency pump is driven and the steering can be operated. When the switch is pressed again, the pump stops.

When the switch is ON, the pilot lamp (red) inside the switch lights up. When the night lighting is switched on, the switch lights up green when it is OFF.

The emergency steering pump can be used for a maximum of 5 minutes.
Move the machine quickly to a safe place beside the road and check the steering circuit.

7. PARKING BRAKE SWITCH



⚠ WARNING

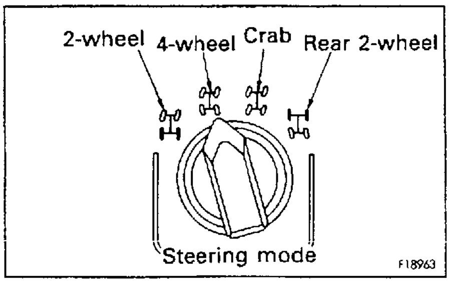
- **If the starting switch is turned OFF when this switch is at the auxiliary brake position, only the parking brake is applied.**
- **When parking the machine, always turn the switch to the parking brake position.**

This switch actuates the parking brake and auxiliary brake.

Auxiliary brake: The parking brake and auxiliary brake (4 wheels) are actuated.
Set the switch to this position for on-tire operations.
Parking brake: The parking brake is actuated.
OFF: The brake is released.

When the switch is actuated, the parking brake and auxiliary brake indicator lamps light up.

8. STEERING MODE SWITCH

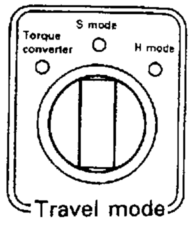


This switches between 2-wheel steering and 4-wheel steering.
2-wheel: Front wheel steering
Use this position for normal travel operations.
4-wheel: Coordinated steering of front and rear wheels
Crab: Crab steering of front and rear wheels
Rear 2-wheel: Rear wheel steering

REMARK

- When traveling on public roads, always use the front 2- wheel steering.
- The 4-wheel, crab, and rear 2-wheel steering modes are actuated only when the rear steering lock CANCELED lamp (red) is lighted up.

9. TRAVEL MODE SELECTOR SWITCH

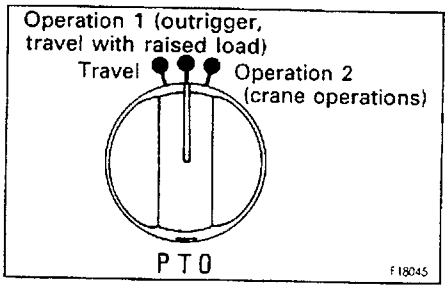


Torque converter: Use this position when traveling in urban areas or on rough terrain.

S mode: Use this for general travel operations.
When using the D range with automatic drive, the machine starts in 2nd.

H mode: Use this for general travel operations when extra acceleration needed, such as travel on slopes or in hilly areas.
When using the D range with automatic drive, the machine starts in 1st.

10. PTO SWITCH


Operation 1 (outrigger, travel with raised load)
Travel
Operation 2 (crane operations)
PTO
F18045

⚠ WARNING

Check that the work equipment control levers are at the neutral position before setting to the "Operation 1" or "Operation 2" positions.

This switch changes the travel condition and operating condition.

Operation 2: This is the position for general crane operations.
The outrigger and travel cannot be operated.

Operation 1: This is the position for outrigger operations and traveling with a raised load.
The work equipment, outriggers, and travel can be operated.

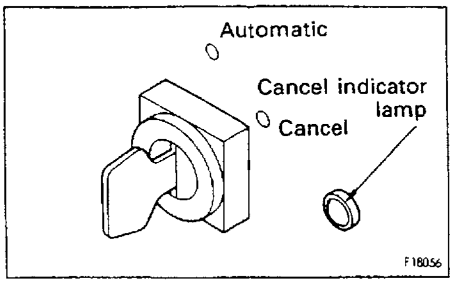
Travel: This is the position for normal travel operations.
The swing can be operated. However, never operate the swing during normal travel operations.

	Operation	Outriggers	Travel
Operation 2	o	x	x
Operation 1	o	o	o
Travel	x	x	o

o: Possible
x: Impossible

Run the engine at low idling when operating the PTO switch.

11. OSS AUTOMATIC STOP SWITCH



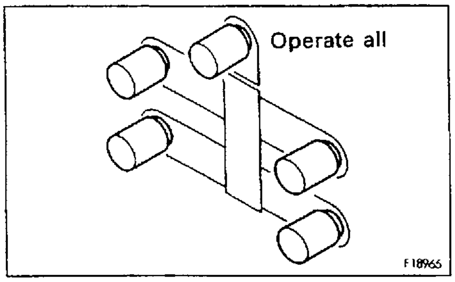
⚠ WARNING

During operations, there is danger of overwinding or the machine overturning, so this switch must not be used.

Use this switch to cancel the automatic stop function of the OSS (Overload Safety System) for inspection and maintenance. Do not use it for normal operations.
When the switch is at the CANCEL position, the indicator lamp (red) lights up.

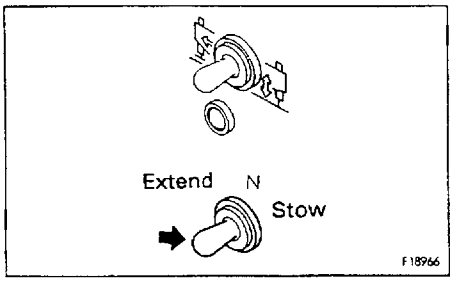
12. OUTRIGGER CONTROL SWITCH

This switch is used to operate the outriggers.



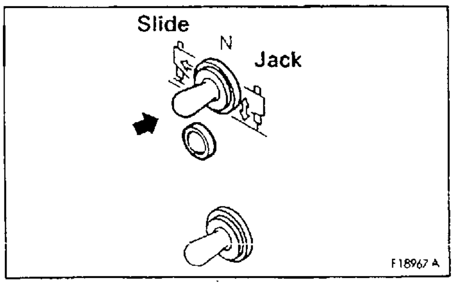
13. OUTRIGGER EXTEND/STOW SELECTOR SWITCH

This switch is used to select between extending and stowing the outrigger.



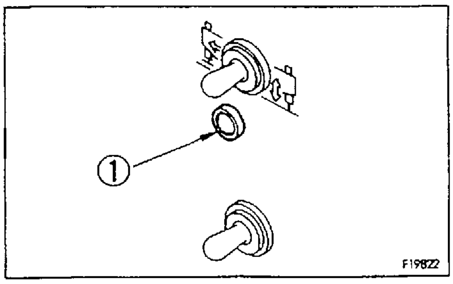
14. OUTRIGGER SLIDE/JACK SELECTOR SWITCH

This switch is used to select between slide and jack operations for the outrigger.



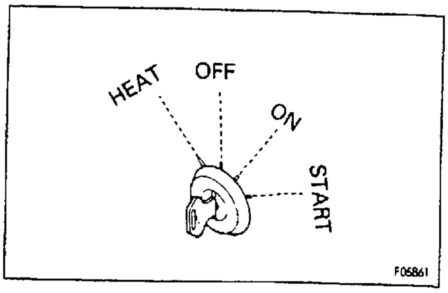
REMARK

For switches (12), (13), and (14), set the PTO switch to the "Operation 1" position before operating.
Switches (12), (13), and (14) are at 2 places: Inside the operator's compartment and on the left side of the machine.
For details of the method of operation, see "12.17 OPERATING OUTRIGGER".
Do not operate the switches on both panels at the same time.
After using, always return the JACK/SLIDE selector switch and EXTEND/STOW selector switch to the neutral position.
If the PTO switch is at the "Operation 1" position but the outrigger EXTEND/STOW selector switch is not at neutral, indicator (1) above the outrigger EXTEND/STOW selector switch will light up.
However, if the external outrigger EXTEND/STOW selector switch is not at neutral, this indicator lamp does not light up.



15. STARTING SWITCH

This switch is used to start and stop the engine.



STOP

The key can be inserted and removed at this position. When the key is turned to this position, the electric circuit isturned off and the engine stops.

ON

Electricity flows to the charging circuit and accessory circuit. Return the key to this position after starting the engine.

START

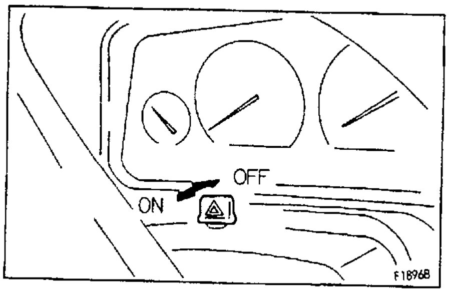
This is the position for starting the engine. When the engine starts, release the key. The key will return automatically to the ON position.

HEAT

When the ambient temperature is low, turn the key to this position to warm up the engine intake air and make it easier for the engine to start. When the key is released, it will return to the STOP position, so turn it immediately to the START position to start the engine.

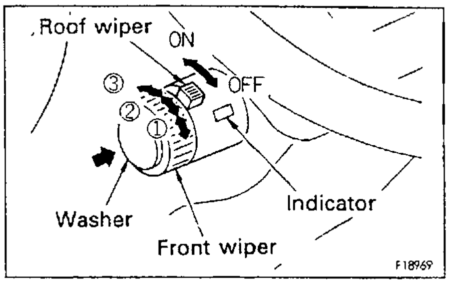
16. HAZARD SWITCH

This is used in emergencies, such as when the machine has broken down.



ON position: Flashes

The left and right turn signal lamps at the front and rear of the machine flash. When the PTO switch is at the TRAVEL position, the swing flasher also flashes.
When this switch is turned ON, the hazard indicator lamp flashes.



17. WIPER, WASHER SWITCH

This switch actuates the wipers for the front glass and roof glass.

Front wiper switch
① INT : The wipers move at 3- to 5-second intervals.
② LOW : The wipers move at low speed.
③ Hi : The wipers move at high speed.

If the button at the tip of the switch is pressed, washer fluid is sprayed out.

Do not keep the washer spray button pressed for more than 10 seconds continuously.

Roof wiper switch
ON position: The roof wiper is actuated.

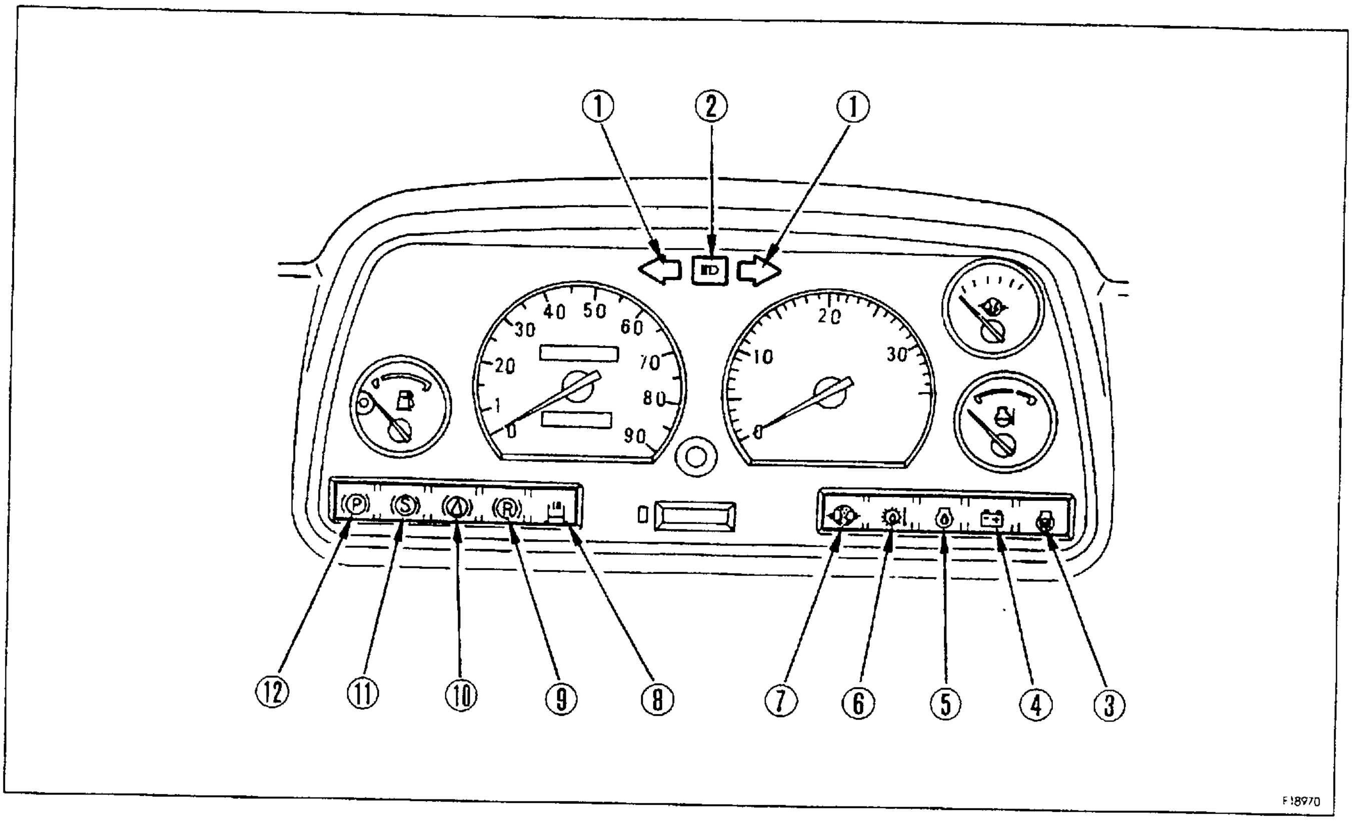
18. RADIO

For details, see "11.17 HANDLING CAR RADIO".

19. OSS CONTROL PANEL

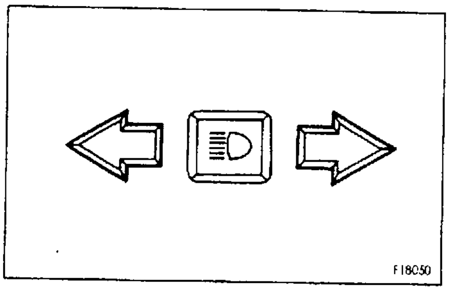
For details, see "12.36 SETTING OVERLOAD SAFETY SYSTEM (OSS)".

11.2.3 LAMPS



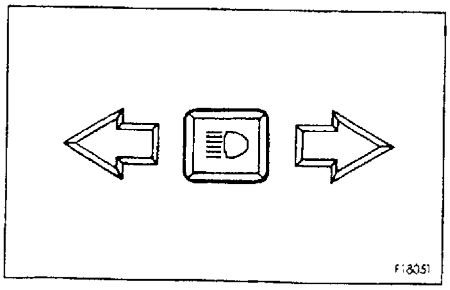
1. TURN SIGNAL INDICATOR PILOT LAMPS

These lamps flash (green) together with the turn signal indicator lamps.



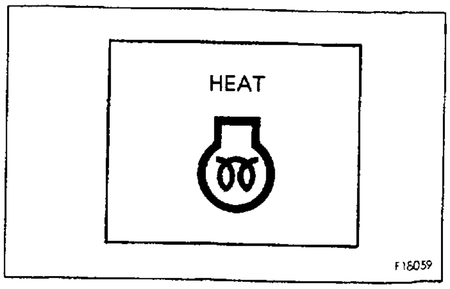
2. HIGH BEAM PILOT LAMP

This lamp lights up (blue) when the head lamps are turned to high beam.

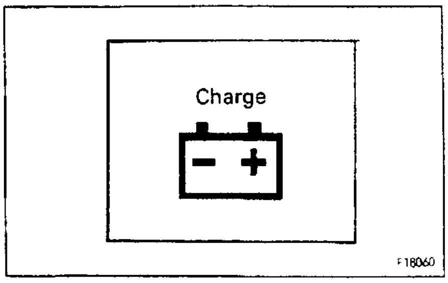


3. GLOW LAMP (RED)

This lights up when the electrical air intake heater is being actuated.



4. BATTERY CHARGE CAUTION LAMP (RED)

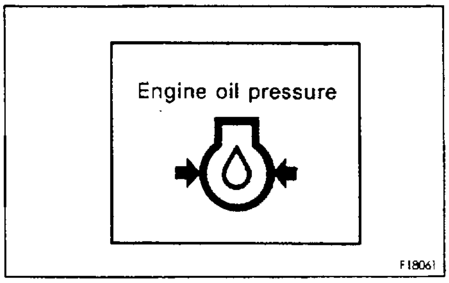


This lamp lights up to warn that the charging is not being carried out properly when the engine is running.
When it lights up, the buzzer sounds.
If it lights up, stop the engine and check the V-belt for looseness. If any abnormality is found, see "15.4 OTHER TROUBLE".

REMARK

When the engine is stopped, if the starting switch is at the ON position, this lamp will light up, but it does not indicate any abnormality.

5. ENGINE OIL PRESSURE CAUTION LAMP (RED)

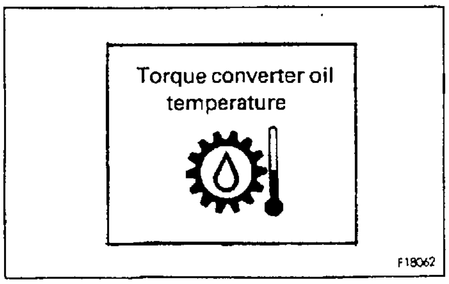


This lamp lights up if the engine lubricating oil pressure goes below the normal value.
When it lights up, the buzzer sounds.
If it lights up, stop the engine, and check for any abnormality. If any abnormality is found, see "15.4 OTHER TROUBLE".

REMARK

When the engine is stopped, if the starting switch is at the ON position, this lamp will light up, but it does not indicate any abnormality.

6. TORQUE CONVERTER OVERHEAT CAUTION LAMP (RED)



This lamp warns the operator if the torque converter oil temperature rises.
When the lamp lights up, the buzzer sounds.
If it lights up during operation, stop the machine, run the engine at low idling, and wait for the temperature to go down.

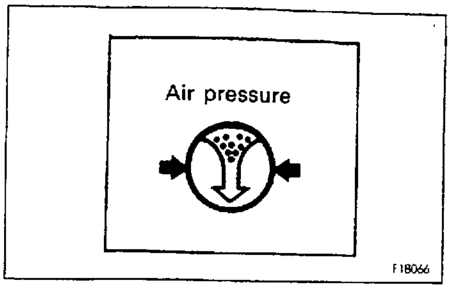
NOTICE

This indicator also lights up when some problem occurs which is not indicated on the monitor. If it lights up, run the engine at low idling to lower the temperature. If it stays ON even when the temperature goes down, please contact your Komatsu distributor.

REMARK

To check that the bulb is not blown, this lamp lights up when the starting switch key is turned to the ON position. Check that it lights up for 2 seconds, and then goes out.

7. AIR PRESSURE CAUTION LAMP (RED)



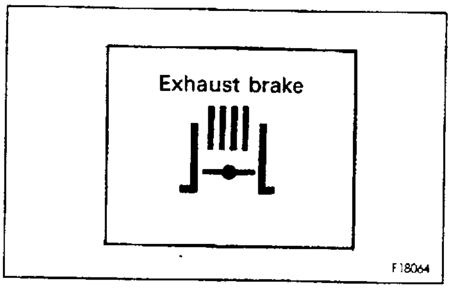
This warns the operator that the air pressure in the air tank has dropped.
When it lights up, the buzzer sounds.
If it lights up, stop the machine, increase the engine speed, and wait for the lamp to go out.

REMARK

If the brake is depressed suddenly, the air pressure lamp may light up momentarily, but this does not indicate an abnormality.

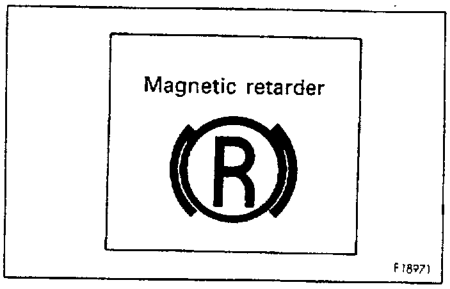
8. EXHAUST BRAKE INDICATOR LAMP (ORANGE)

This informs the operator that the exhaust brake switch is ON.

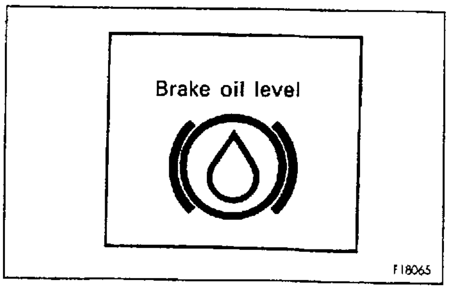


9. MAGNETIC RETARDER INDICATOR LAMP (ORANGE) (OPTION)

This informs the operator that the magnetic retarder (option) switch is ON.



10. BRAKE OIL LEVEL CAUTION LAMP (RED)



This warns the operator that the level of the brake fluid in the tank has dropped.
When it lights up, the buzzer sounds.
If it lights up, stop the machine, and check for leakage of the brake fluid. If any leakage is found, repair the problem, then add brake fluid.
If the machine is driven continuously downhill, the brake fluid may overheat. In this condition, the lamp may also light up. If this happens, wait for at least 30 minutes, then depress the brake pedal and check that the lamp does not light up. If there is no abnormality, the machine may be driven again.

REMARK

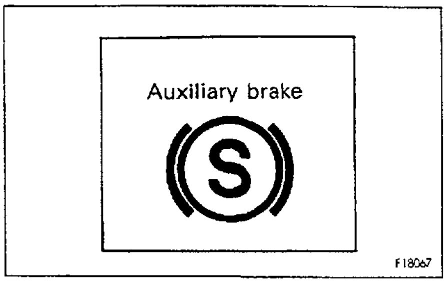
When the starting switch key is turned to the ON position, this lamp will light up for 2 seconds and then go out.

11. AUXILIARY BRAKE INDICATOR LAMP (RED)

This lights up when the auxiliary brake is actuated.

Auxiliary brake ON: Lights up

Before moving the machine, check that the lamp is out.

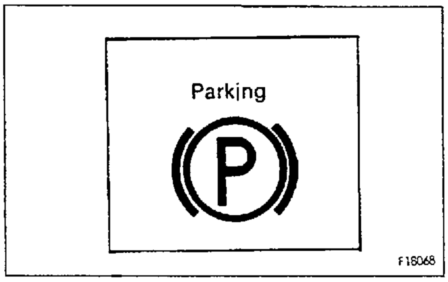


12. PARKING BRAKE INDICATOR LAMP (RED)

This lights up when the parking brake is actuated.

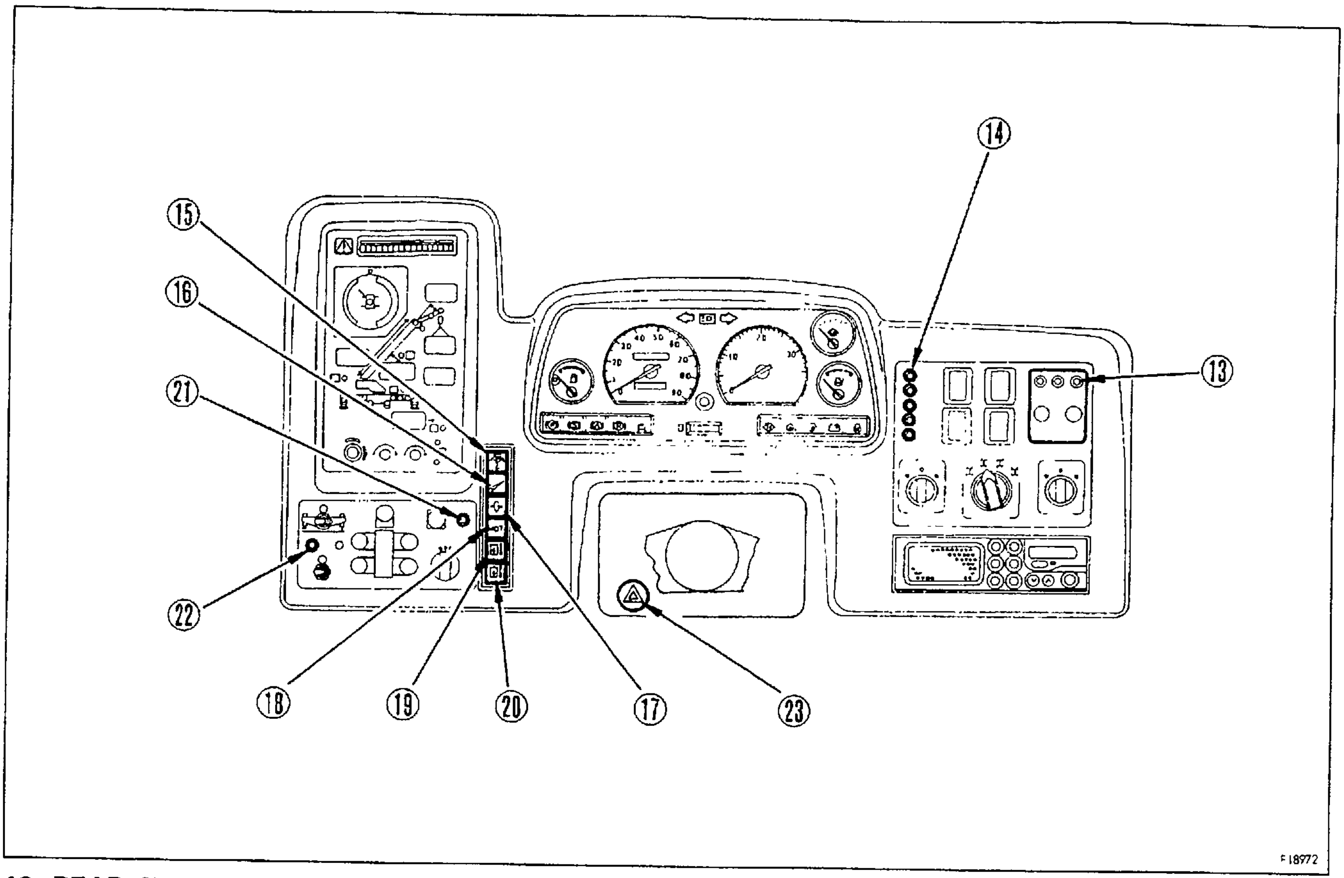
Parking brake switch at AUXILIARY or PARKING: Lights up

Before moving the machine, check that the lamp is out.



REMARK

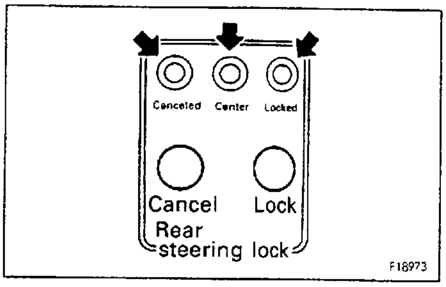
While the parking brake is applied, if the gear shift lever is moved to any position other than N, the buzzer will sound.



13. REAR STEERING LOCK INDICATOR LAMP

This shows if the rear wheels are at the center and shows what position the lock pin is in. The lamps go out, flash, or light up; the combination of the lamps indicates the condition.

When the rear steering lock is not applied, center ☼, lock ●, cancel ● lamp display lights up, but do not travel in this condition. Insert the lock pin and light up the lock lamp (lock ☼) before traveling. For details of using the lock, see "12.12 SPECIAL TRAVEL".



- Combination

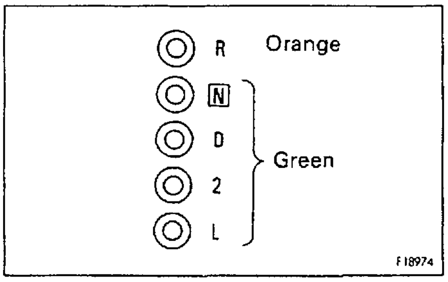
	Cancel	Center	Lock	Condition
Normal	●	☼	☼	Lock applied
	☼	☼	●	Free, 4/crab steering
	☼	●	●	
Defective operation	◐	☼	●	2-wheel steering. Apply rear steering lock
	●	☼	◐	4-crab steering. Cancel rear steering lock
Failure	◐	◐	◐	Failure in command (switch) system
	◐	—	◐	Failure in FREE/LOCK detection switch
	●	◐	◐	Failure in center detection switch
	●	●	●	Failure in detection system

If any of the failure displays appears, try canceling the rear steering lock.

Key to symbols
☼ : ON, ◐ : Flashes, ●: OFF

14. GEAR SHIFT LEVER POSITION INDICATOR

This shows the position of the gear shift lever.

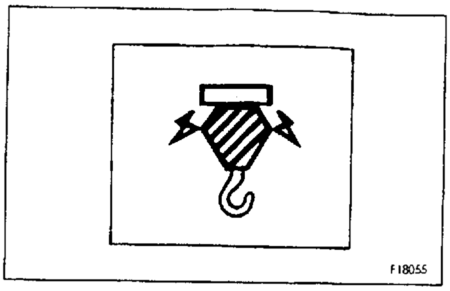


15. WINCH OVERWIND CAUTION LAMP (RED)

This flashes when the main hook or auxiliary hook have been wound in too far.

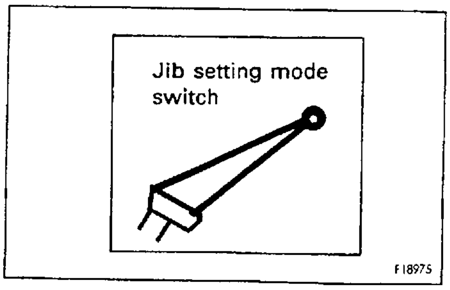
The lamp flashes, and at the same time, the automatic stop is actuated and the alarm buzzer sounds.

If the lamp flashes, wind out the main hook or auxiliary hook.


F18055

16. JIB EXTENSION CAUTION LAMP (RED)

This indicates at the jib mode switch is ON.



F18975

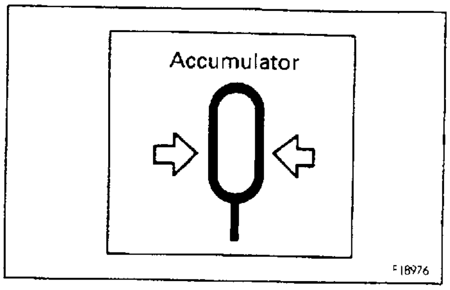
17. ACCUMULATOR PRESSURE CAUTION LAMP (RED)

⚠ WARNING

- **If this lamp lights up, lock the drums of both the main winch and auxiliary winch and contact your Komatsu distributor.**
- **If this lamp lights up, place the winch levers of both the main winch and auxiliary winch at the N position. Do not operate the winches under any circumstances.**

This lamp indicates that the pressure in the winch clutch cylinder has dropped.

When it lights up, the alarm buzzer sounds, so stop operations immediately.

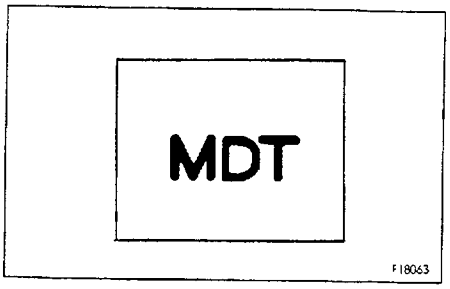


F18976

18. MDT CHECK LAMP (RED)

This informs the operator that there is an abnormality in the multi-transmission system (MDT) which carries out the control and communications for the machine.

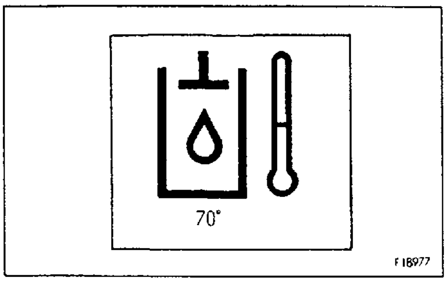
OFF: System is working normally
Rapid flashing (45 times/min): Abnormality in communications system
Slow flashing (23 times/min): Abnormality in input system
ON: Lamp lights up for approx. 2.5 sec when starting switch key is turned to ON position, and then goes out.



F18063

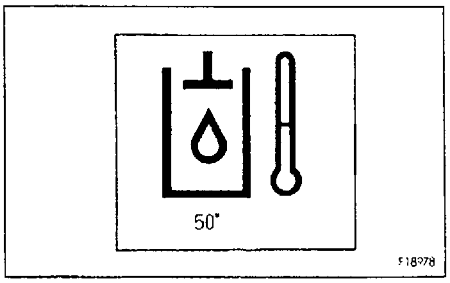
19. HYDRAULIC OIL TEMPERATURE INDICATOR 70°C (ORANGE)

This lights up when the hydraulic oil temperature goes above 70°C.
If it lights up, turn on the hydraulic oil cooler switch.



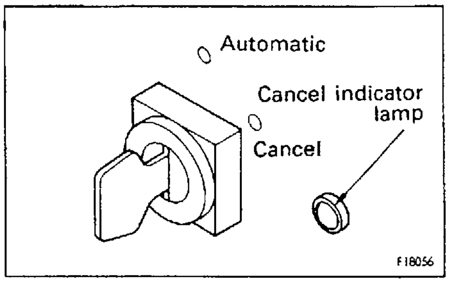
20. HYDRAULIC OIL TEMPERATURE INDICATOR 50°C (GREEN)

This lights up when the hydraulic oil temperature goes above 50°C.



21. OSS CANCEL INDICATOR (RED)

This lights up when the OSS cancel switch is turned to the CANCEL position.

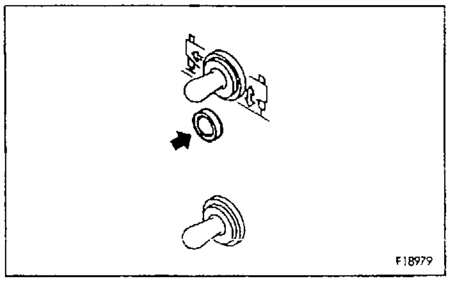


22. OUTRIGGER NEUTRAL DETECTION INDICATOR (RED)

⚠ WARNING

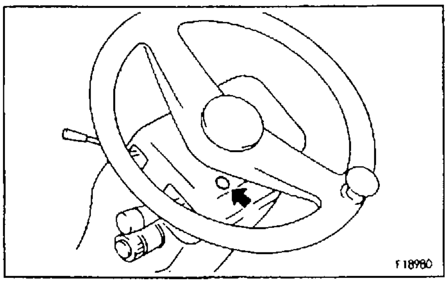
This lamp does not light up if the EXTEND/STOW selector switch of the outrigger control switch outside the operator's cab is not at the neutral position. After operating, always check that the switch is at the neutral position.

This lamp lights up when the telescope selector switch of the outrigger control switch outside the operator's cab is not at the neutral position.
It is actuated only when the PTO switch is at the "Operation 1" position. If this lamp lights up, set the outrigger switch to the neutral position before starting operations.
It stays lighted up while the outriggers are being operated.

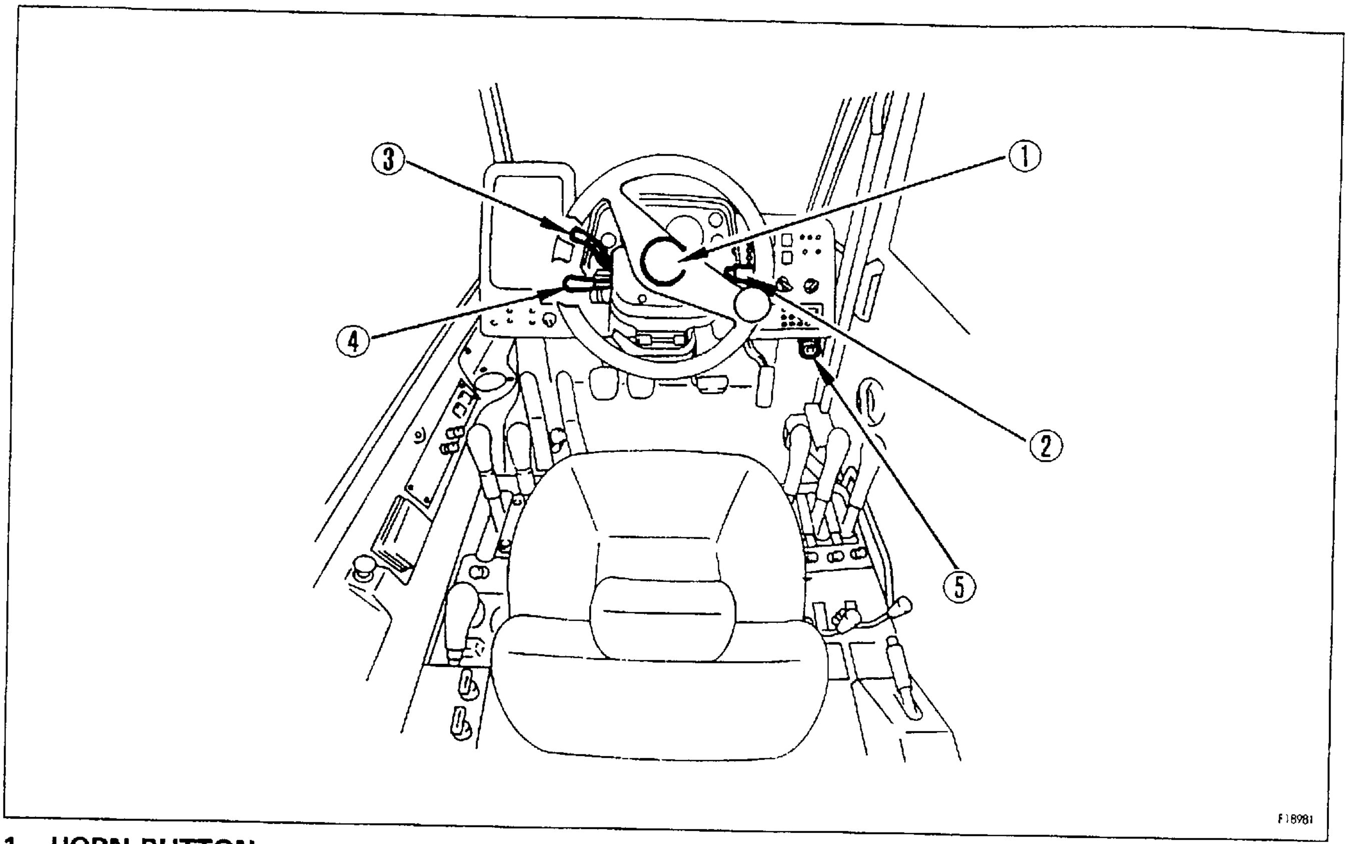


23. HAZARD SWITCH INDICATOR (RED)

This flashes when the hazard switch is ON.

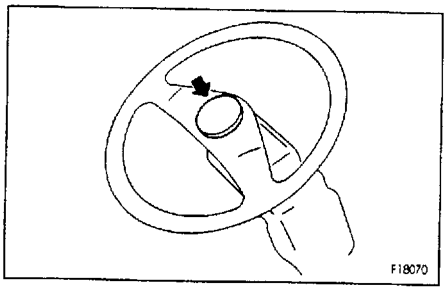


11.2.4 LEVERS AND SWITCHES



1. HORN BUTTON

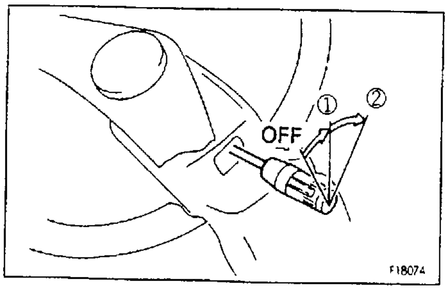
Press the button in the center of the steering wheel to sound the horn.



2. LAMP SWITCH

This switch is turned to light up the head lamps, tail lamps, license number lamp, boom lamp, side clearance lamps, and gauge lighting.

① Stage 1: Tail lamps, number lamp, boom lamp, side clearance lamp, and gauge lighting light up
② Stage 2: Head lamps light up in addition to lamps at stage ①.

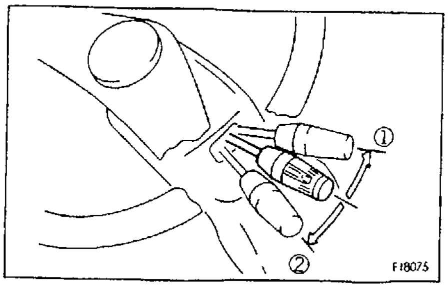


3. TURN SIGNAL INDICATOR LEVER

This operates the turn signal indicator lamps.

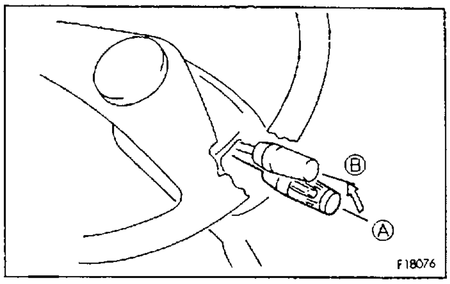
① Left turn: Push the lever forward
② Right turn: Pull the lever back

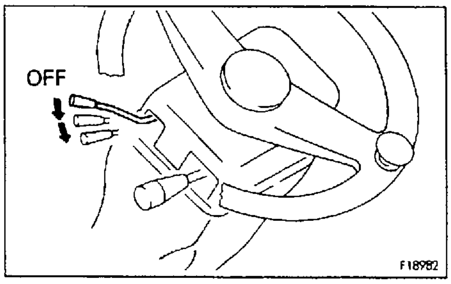
When the lever is operated, the turn signal pilot lamp also flashes at the same time. When the PTO switch is at the TRAVEL position, the swing flasher also flashes.



2. DIMMER SWITCH

This switches the head lights between the high beam and low beam positions.
Operate the lever in direction Ⓑ until a click is heard. Each time there is a click, the head lamps are switched from low beam to high beam or from high beam to low beam.
If the lever is operated to the position before the click is heard, the head lamps will flash to inform the vehicle in front that you are going to pass.
The head lamps can be flashed even when the lamp switch is at the OFF position.
When the lever is released, it will return automatically to the Ⓐ position.





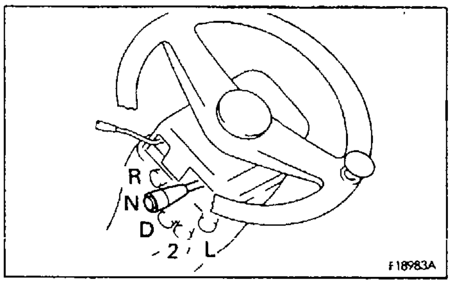
3. EXHAUST BRAKE SWITCH, MAGNETIC RETARDER SWITCH (OPTION)

This switch is used to reduce the load on the foot brake when traveling downhill or when traveling in urban areas where the foot brake must be operated frequently.

① Exhaust brake:
If the accelerator pedal is released, the exhaust brake is applied.
② Exhaust brake + magnetic retarder (option):
For machines equipped with the magnetic retarder, if the accelerator pedal is released, the exhaust brake and magnetic retarder are applied.

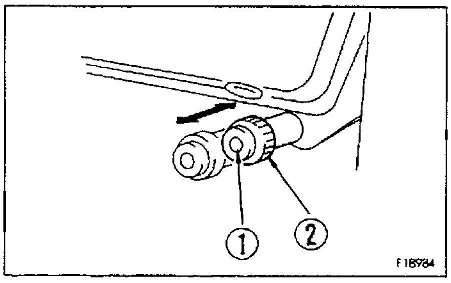
4. GEAR SHIFT LEVER

This lever is used to select the direction of travel and the speed range of the transmission.
If this lever is not at the N position when starting the engine, the engine will not start.
Three forward ranges (D, 2, L) and 1 reverse position (R) can be selected.
The transmission is shifted automatically only when the lever is at the D position.
When shifting 2 → L, N → R, lift up the lever to move it.



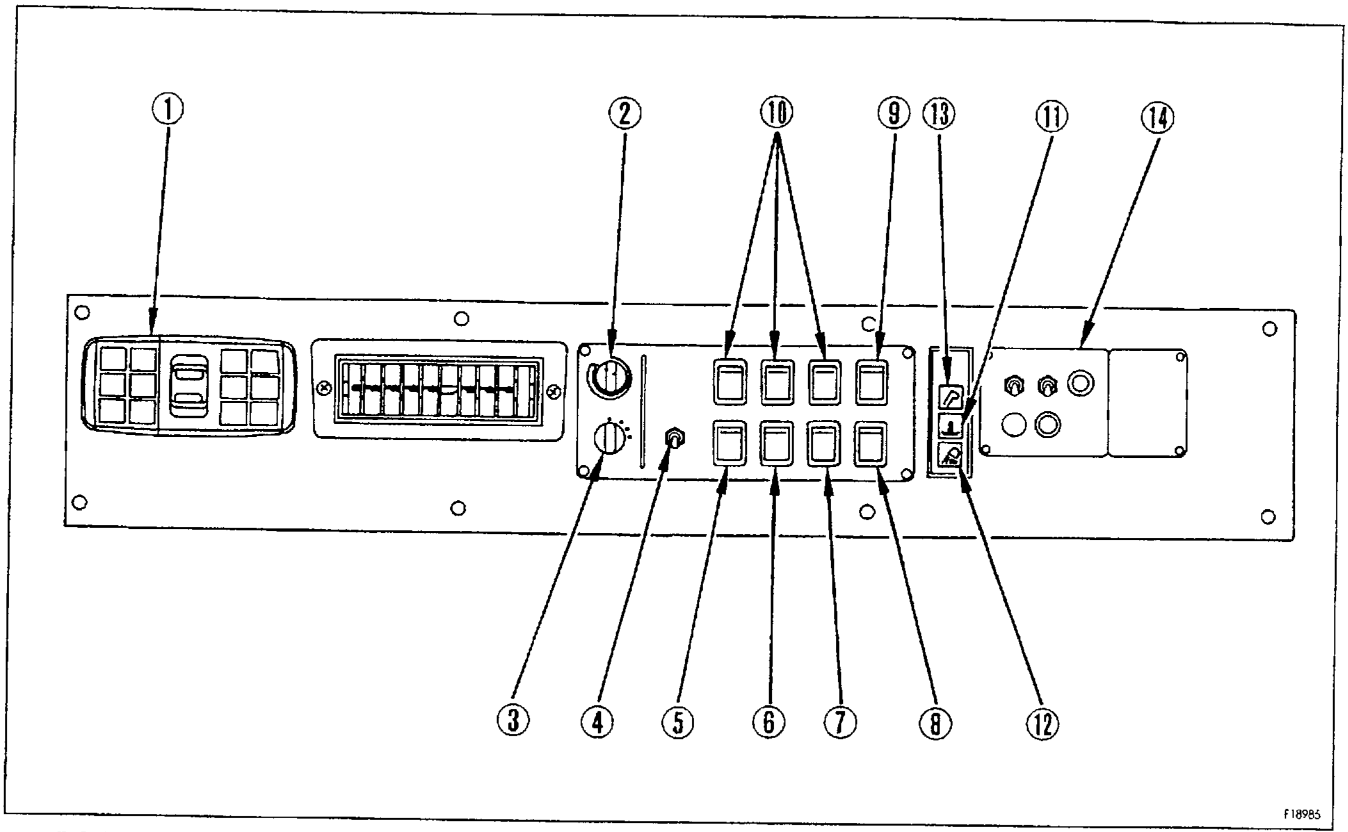
5. ACCELERATOR THROTTLE KNOB

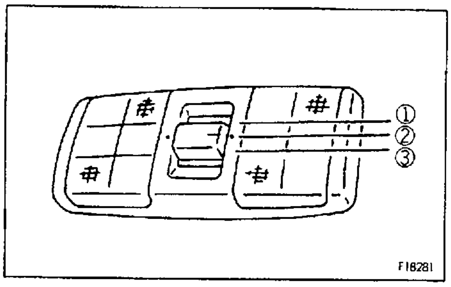
> **⚠ WARNING**
>
> **The engine throttle knob must not be used when traveling.**



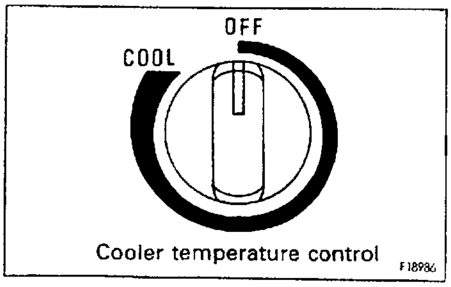
This switch is used to maintain the engine speed.
(1) If push button ① is kept pushed in and knob ② is pulled, the engine speed will rise.
(2) To make fine adjustment of the engine speed, turn knob ②.
(3) After setting the engine speed, release push button ①, and knob ② will be locked.

11.3 TOP PANEL GROUP



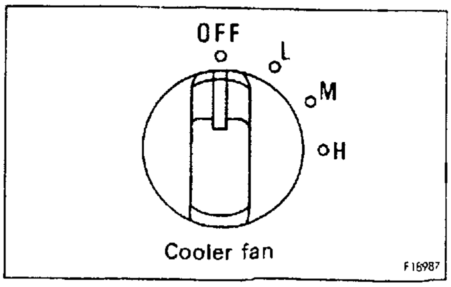


1. ROOM LAMP
The room lamp can be lighted up.
①: OFF
②: When the door is opened it lights up, and when the door is closed, it goes out.
③: ON
Be careful not to leave the lamp ON.



Cooler temperature control

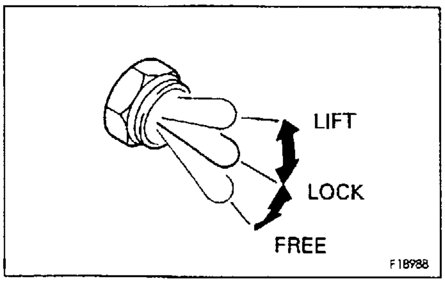
2. COOLER TEMPERATURE CONTROL SWITCH
This is used to control the car cooler temperature.



Cooler fan

3. COOLER FAN SWITCH
This acts as the main switch and the fan speed switch.

REMARK
For details of the operation of switches 2 and 3, see "11.18 CAR COOLER".

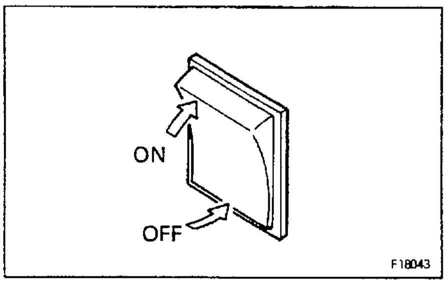


4. SUSPENSION SWITCH

This switch is used to adjust the suspension cylinder.

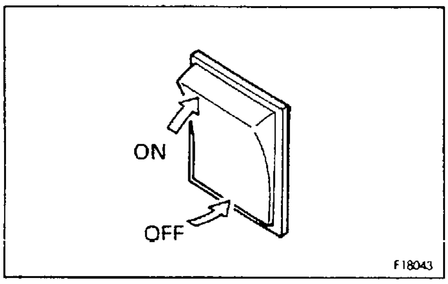
LIFT: The suspension cylinder is retracted. Set the PTO switch to the "Operation 1" or "Operation 2" position when operating this switch.
LOCK: The suspension cylinder is locked.
FREE: The suspension cylinder is made free.

When this switch is turned to the LOCK position, the suspension lock indicator lamp lights up.
If the PTO switch is turned to the "Operation 1" or "Operation 2" positions, the suspension is automatically locked for safety reasons. In this case, if the suspension switch is at the FREE position, the lock indicator does not light up.



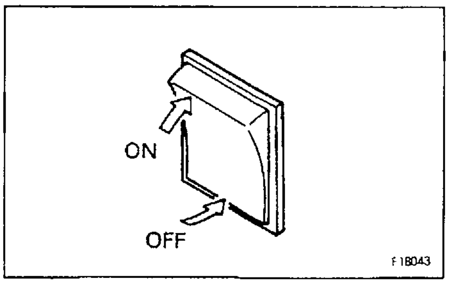
5. WORKING LAMP SWITCH

This switch is used to operate the working lamp.



6. OIL COOLER SWITCH

This switch is used to operate the oil cooler for the hydraulic oil.



7. SWING ALARM BUZZER SWITCH

This switch is used for the swing alarm buzzer.

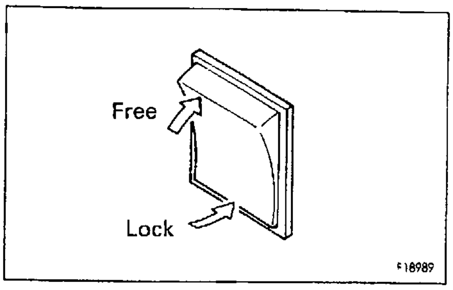
8. SWING SWITCH

This is used to switch the swing mechanism between the FREE and LOCK positions.

FREE: This is used when carrying out continuous operations of the swing.

LOCK: This is used when carrying out normal swing operations.

- Always stop the swing before operating the switch between the FREE and LOCK positions.
- When the switch is at the FREE position, be careful about overrun caused by the slope, wind, or inertia when swinging.

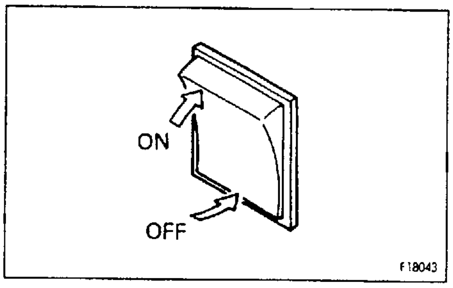


9. DEFROSTER FAN SWITCH

If the front glass becomes misted up, use this switch to warm the surface of the glass and remove the mist.

ON: The defroster fan is actuated.

Use this switch when the heater is ON.



10. SPARE SWITCHES

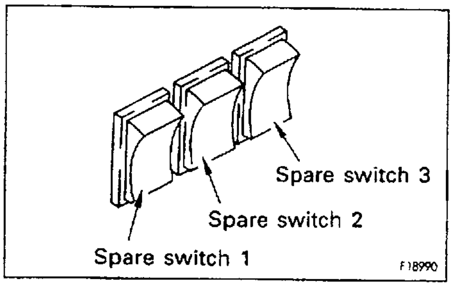
These spare switches are for optional attachments.

When the starting key is at the ON position, 24V is supplied.

Spare switch.1: For service lamp (working lamp at side of chassis)

Spare switch 2: For rotating lamp

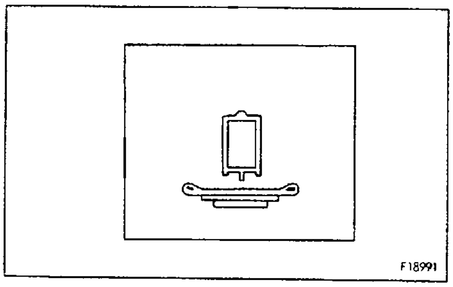
Spare switch 3: For fan



11. SUSPENSION LOCK INDICATOR (GREEN)

This lights up when the suspension is locked.

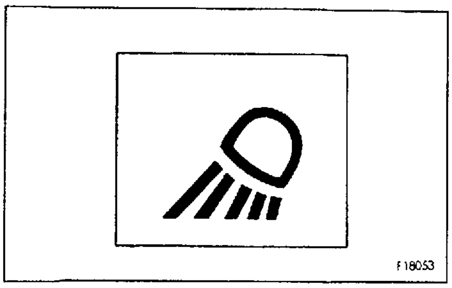
Suspension switch LOCK: ON



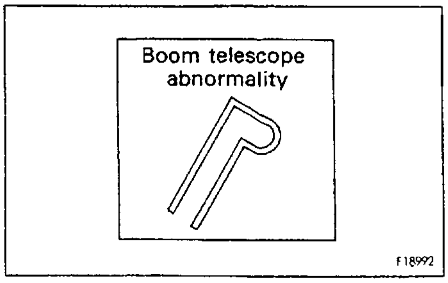
12. WORKING LAMP INDICATOR LAMP (BLUE)

This lights up when the switch for the working lamp is turned ON.

Turn the working lamp out when traveling.



13. BOOM TELESCOPE ABNORMALITY INDICATOR (RED)



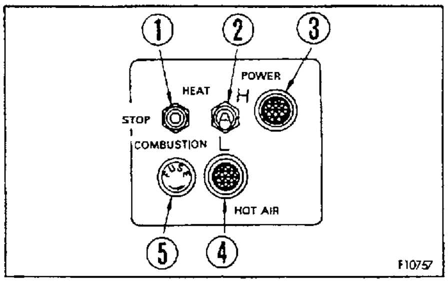
⚠ WARNING

Do not operate the crane under any circumstances when the boom telescope abnormality indicator lamp is lighted up. The machine will suffer damage.

This lamp lights up if the 3rd or top boom are extended when the 2nd boom is not fully extended.
If it lights up, extend the 2nd boom fully, or retract the 3rd and top boom fully.
This lamp may also light up if the boom select switch is used to extend or retract the boom.

14. CAR HEATER SWITCH

This switch operates the car heater.

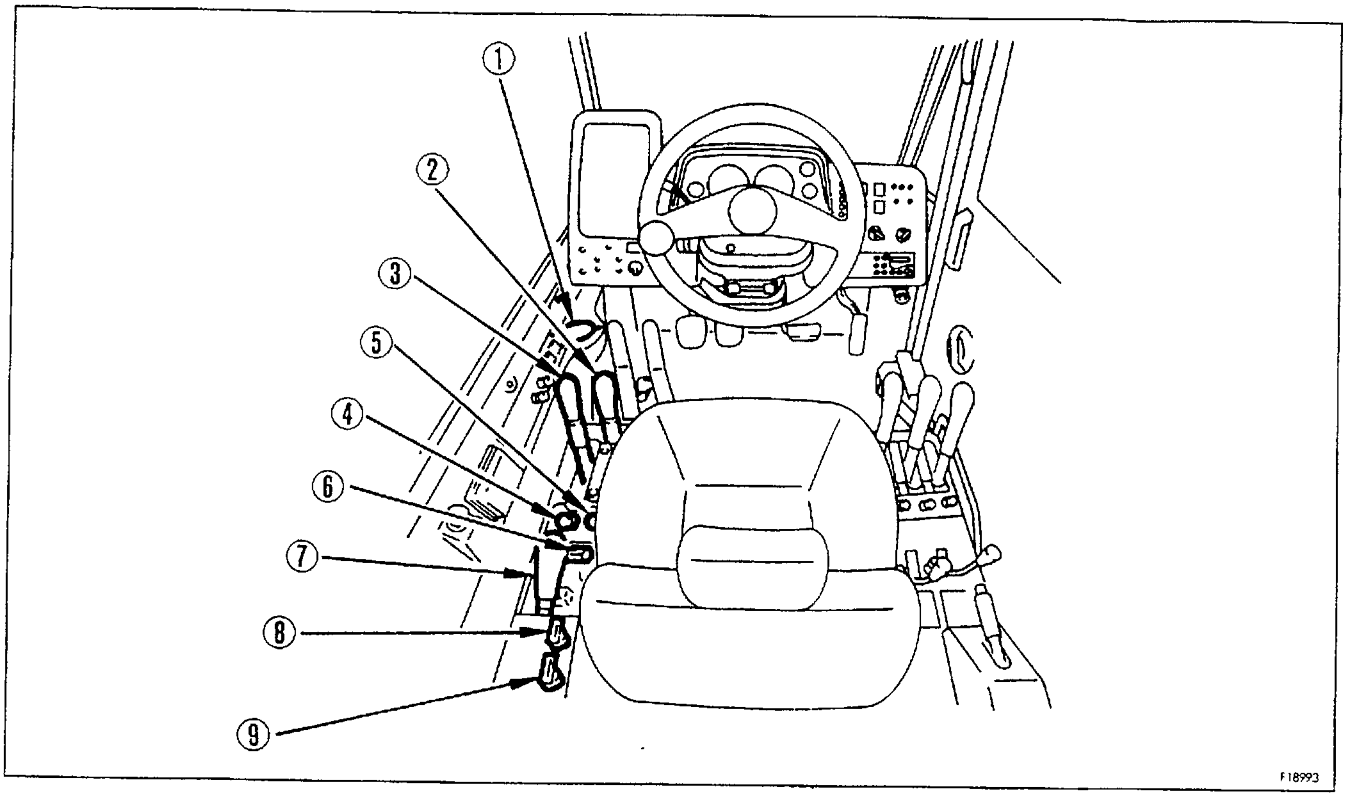


① Heater main switch
② Hi-Low selector switch
③ Power pilot lamp (red lamp)
④ Hot air lamp (milky white lamp)
⑤ Fuse

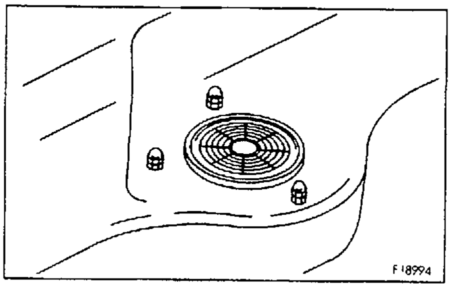
For details of the operation, see "11.19 CAR HEATER".

11.4 SIDE PANEL GROUP

11.4.1 LEFT SIDE PANEL

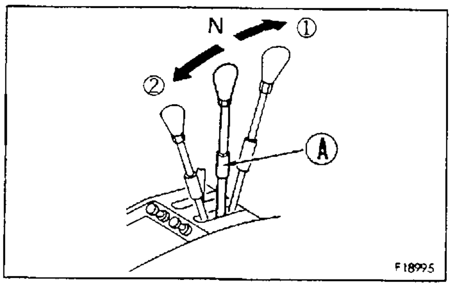


1. **SPIRIT LEVEL**



This is used to check that the chassis is horizontal.
Always set the chassis in a horizontal position when carrying out operations.

2. **BOOM HOIST CONTROL LEVER**



This is used to raise or lower the boom.
Position ①: LOWER
Position ②: RAISE
N position: The boom is stopped and kept at the same position.

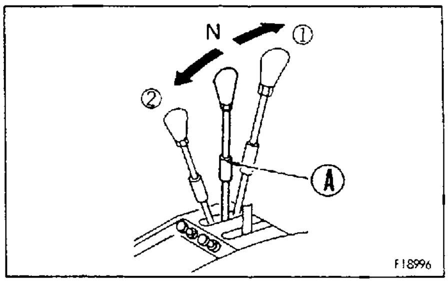
REMARK

If intermediate ring Ⓐ is loosened, the height of the lever can be adjusted freely, so set it to a suitable height.

3. SWING CONTROL LEVER (WITH HORN SWITCH)

This is used to swing the upper structure.

Position ①: Left swing
Position ②: Right swing
N position: The upper structure is stopped and kept at the same position.



When the lever is operated, the swing flasher flashes and the horn sounds.(If the PTO switch is at any position other than OPERATION, the flasher will not flash and the horn will not sound.)

HORN SWITCH

Press the button at the tip of the lever to sound the horn.

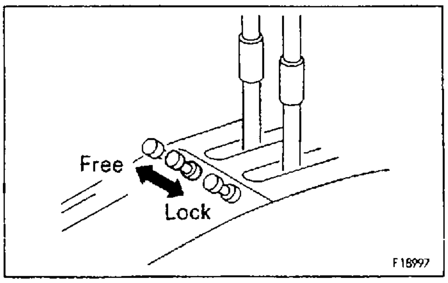
REMARK

If intermediate ring Ⓐ is loosened, the height of the lever can be adjusted freely, so set it to a suitable height.

4. SWING CONTROL LEVER LOCK PIN

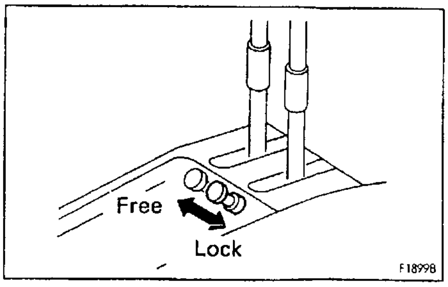
⚠ WARNING

When not carrying out operations, always place the swing control lever at the neutral position and apply the lock.



This pin is used to lock the swing lever.
When setting to the FREE position, pull up until the lock pin stops. When applying the lock, push the lock pin down and check that the swing control lever is locked.

5. HOIST CONTROL LEVER LOCK PIN

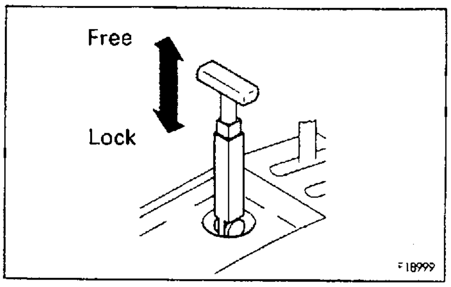


⚠ WARNING

When not carrying out operations, always place the hoist control lever at the neutral position and apply the lock.

This pin is used to lock the hoist lever.
When setting to the FREE position, pull up until the lock pin stops.
When applying the lock, push the lock pin down and check that the winch control lever is locked.

6. SWING LOCK LEVER



⚠ WARNING

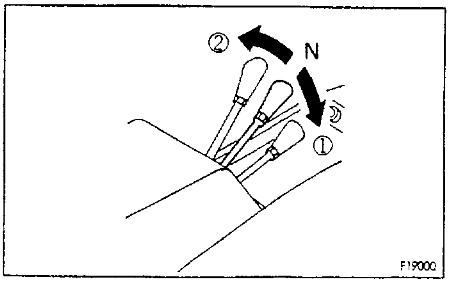
Never operate the swing when the swing lock lever is at the LOCK position.

This lever is used to lock the upper structure.
Pull the lever up to release the lock.
Apply the lock for general travel operations and when traveling with a raised load.

NOTICE

When applying the lock, always make sure that the upper structure is parallel to the chassis.

7. BOOM TELESCOPE CONTROL LEVER



This is used to extend and retract the boom.
Position ①: Extend
Position ②: Retract
N position: The boom is stopped and held at the same position.

NOTICE

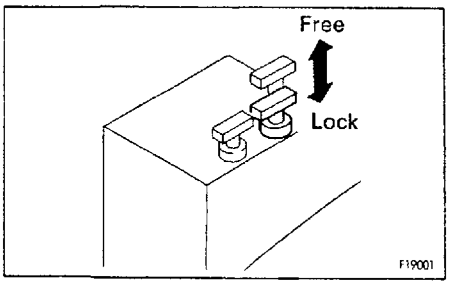
There is an overwind safety system, so lower the hook before extending the boom.

8. MAIN WINCH DRUM LOCK KNOB

This knob is used to lock the main winch drum.
LOCK: The drum can only rotate in the winding-in direction.
FREE: The drum can rotate the both directions.

REMARK

When setting the drum lock to the FREE position, wind in the winch slightly before operating the knob. To set the knob to the FREE position, turn the knob counterclockwise and push it in.

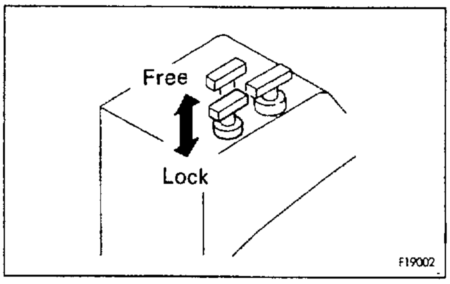


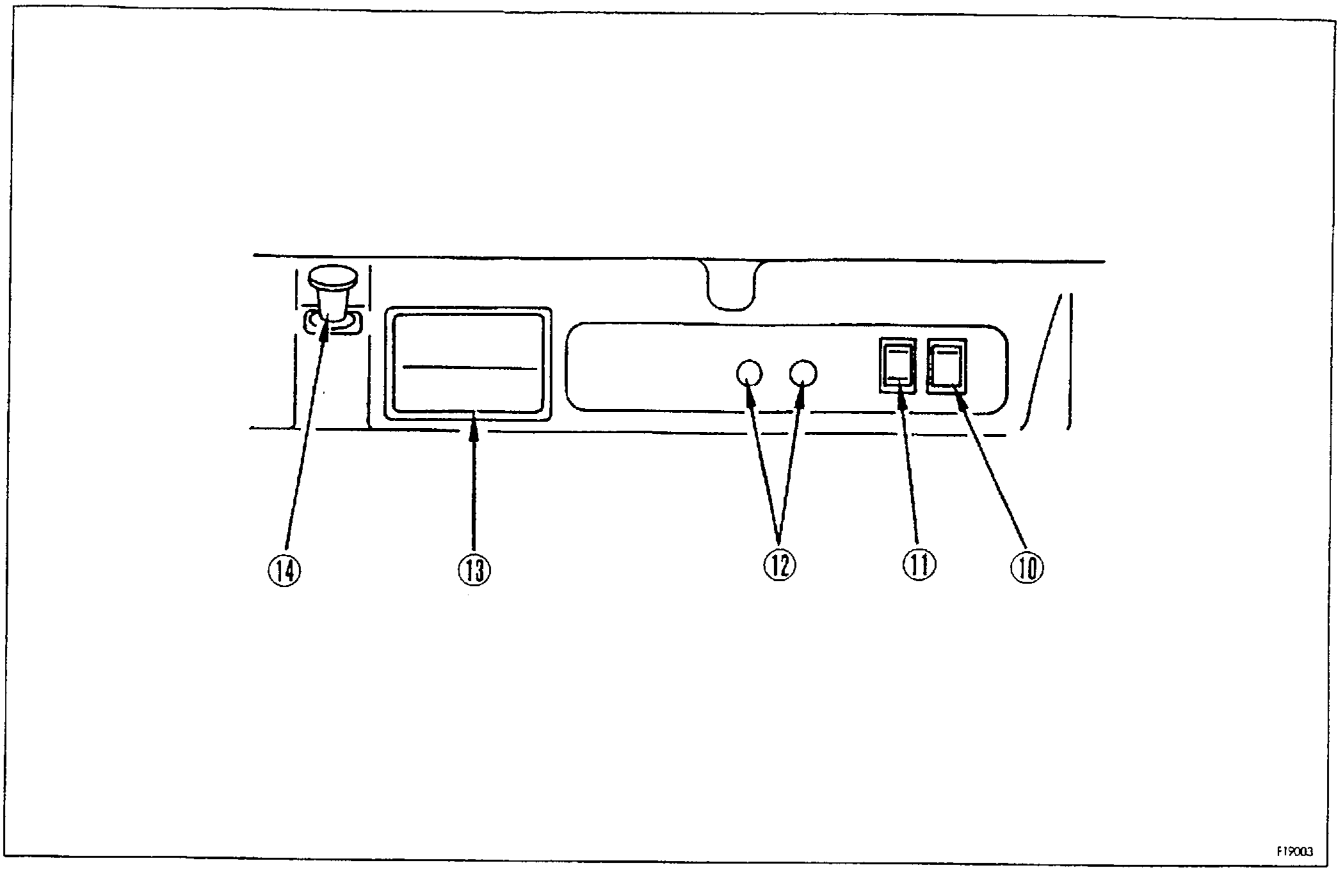
9. AUXILIARY WINCH DRUM LOCK KNOB

This knob is used to lock the auxiliary winch drum.
LOCK: The drum can only rotate in the winding-in direction.
FREE: The drum can rotate the both directions.

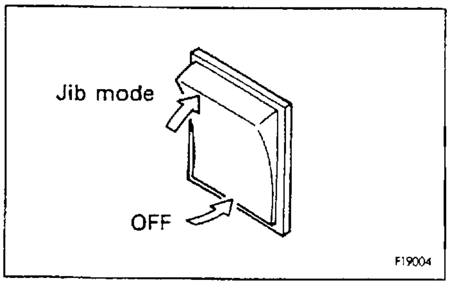
REMARK

When setting the drum lock to the FREE position, wind in the winch slightly before operating the knob. To set the knob to the FREE position, turn the knob counterclockwise and push it in.





10. JIB MODE SWITCH

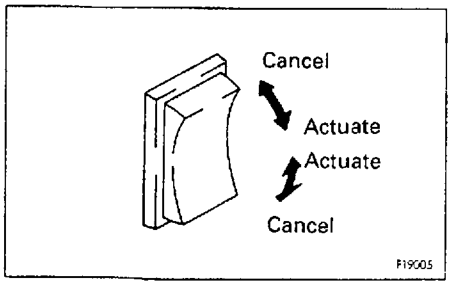


⚠ WARNING

If the system is set to the jib mode, the overwind automatic stop will not work. Never use this switch for any operation except extending or stowing of the jib.

Use this switch to cancel the overwind automatic stop when extending or stowing the auxiliary jib. Always turn this switch OFF for normal operations.

11. OVERWIND CANCEL SWITCH

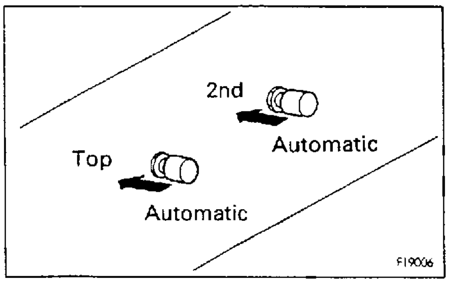


If the overwind alarm switch for the main hook or auxiliary hook is actuated, the automatic stop is actuated and it becomes impossible to wind in the hook. If you want to wind the hook in further, press this switch to make it possible to continue the winding-in operation.

NOTICE

It is also possible to cancel the overwind with the OSS automatic stop cancel switch, but this means that the automatic stop function is ignored, which may be dangerous, so when the overwind alarm is given, use this switch to cancel it.

12. BOOM SELECTOR SWITCH



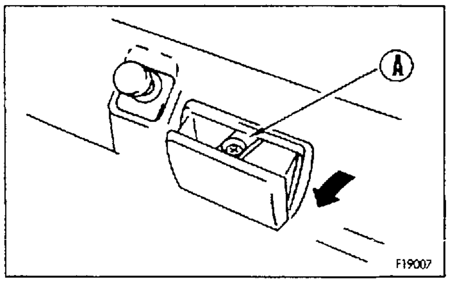
> **WARNING**
>
> **Never operate the boom select switch during crane operations. The machine may be damaged.**

This switch is used for inspection and maintenance to extend or retract the desired boom when it is necessary to extend or retract the boom in a different order from the automatic operation.

Top: Extension and retraction of 3rd or top boom
Automatic: Automatic extension and retraction
2nd: Extension and retraction of 2nd boom only

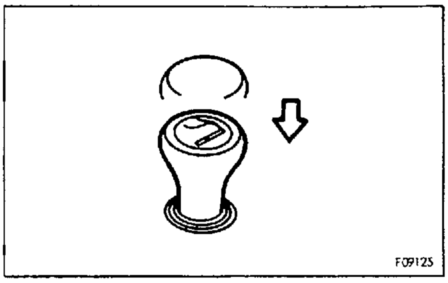
The condition is switched only while the switch is being pressed. During crane operations, always use automatic extension and retraction.
Never press the top or 2nd switch for crane operations.

13. ASHTRAY



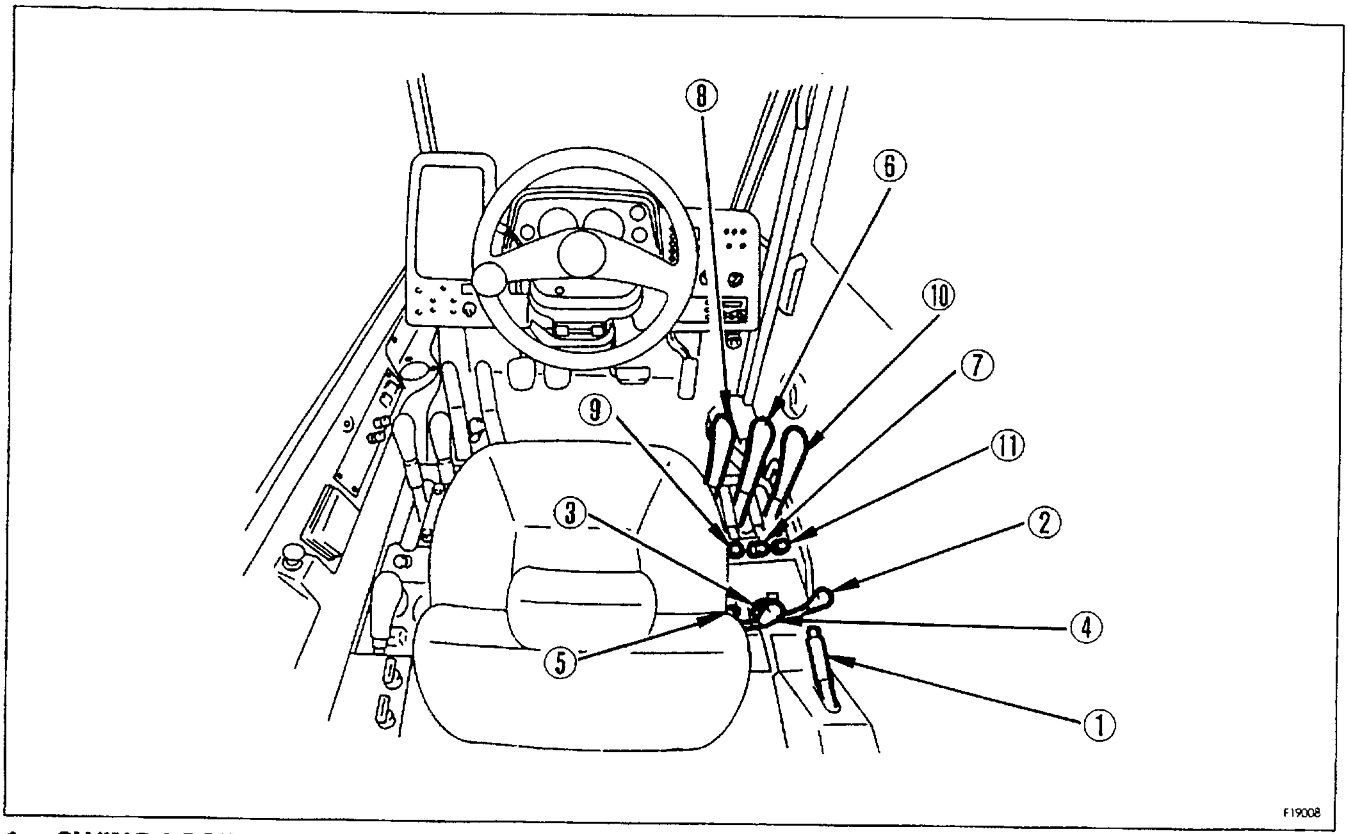
Pull the ashtray to open.
Press Ⓐ to remove the ashtray.

14. CIGARETTE LIGHTER

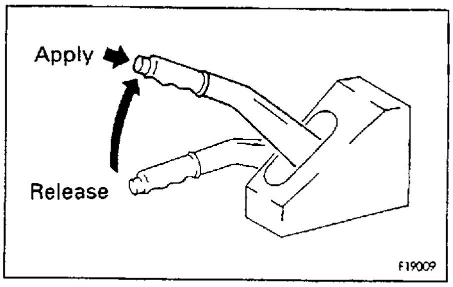


This is used to light cigarettes. If the cigarette lighter is pushed in, it will return to its original position after a few seconds, so pull it out and use it to light your cigarette.

11.4.2 RIGHT SIDE PANEL



1. SWING LOCK BRAKE LEVER

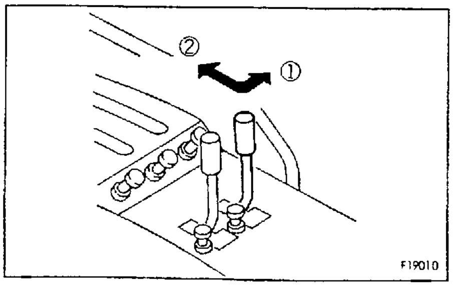


This applies the lock brake for the upper structure.
Pull the lever up to apply the brake. To release the brake, press the lock button and lower the lever.

NOTICE

Use this lever when leaving the machine or when keeping a load raised. Do not use it for braking during swing operations.

2. MAIN CLUTCH LEVER



This is used to operate the clutch for the main winch.

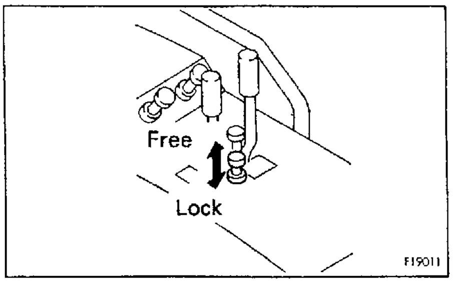
① ON: The main winch clutch is engaged. For normal operations, place the lever in this position.

② OFF: The main winch clutch is disengaged.
Set the lever to this position for free-fall operations.

NOTICE

When carrying out operations with the auxiliary winch, always lock this lever at the ON position. When setting the clutch lever to the OFF position, always depress the main winch brake pedal.

3. MAIN CLUTCH LEVER LOCK PIN

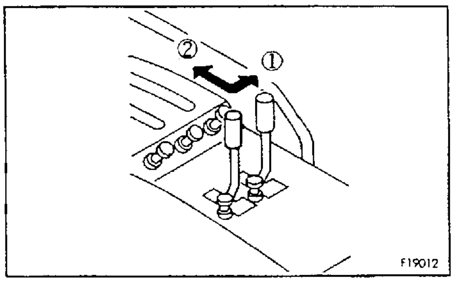


⚠ WARNING

- **When not carrying out operations, always operate this pin to lock the main clutch lever.**
- **When moving the clutch lever from the OFF position to the ON position, always operate the lever fully to the rear and check that it is at the ON position, then slowly release the winch brake pedal.**
  When releasing the pedal, apply the lock to the clutch lever.

This pin is used to lock the main clutch lever.

4. AUXILIARY CLUTCH LEVER



This is used to operate the clutch for the auxiliary winch.

① ON: The auxiliary winch clutch is engaged. For normal operations, place the lever in this position.

② OFF: The auxiliary winch clutch is disengaged.
Set the lever to this position for free-fall operations.

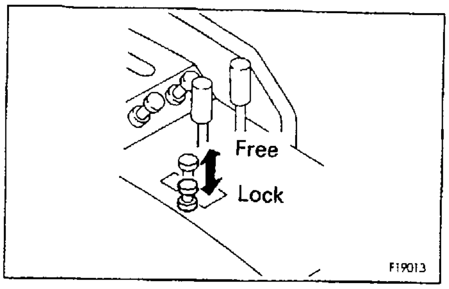
NOTICE

When carrying out operations with the main winch, always lock this lever at the ON position. When setting the clutch lever to the OFF position, always depress the auxiliary winch brake pedal.

REMARK

When moving the clutch lever from the ON position to the OFF position, push the lever down and to the front. When returning it from the OFF position to the ON position, pull the head of the lever back lightly.

5. AUXILIARY CLUTCH LEVER LOCK PIN

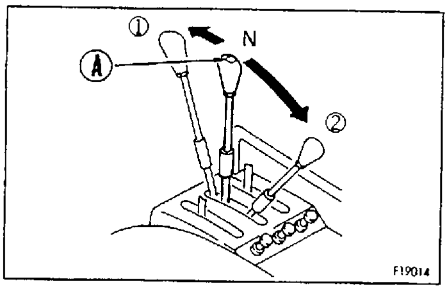


⚠ WARNING

- **When not carrying out operations, always operate this pin to lock the auxiliary clutch lever.**
- **When moving the clutch lever from the OFF position to the ON position, always operate the lever fully to the rear and check that it is at the ON position, then slowly release the winch brake pedal.**
  When releasing the pedal, apply the lock to the clutch lever.

This pin is used to lock the auxiliary clutch lever.

6. MAIN WINCH CONTROL LEVER



⚠ WARNING

When winding in a load, operate swing free switch Ⓐ when the load comes off the ground, and release the switch after the load is clear of the ground.

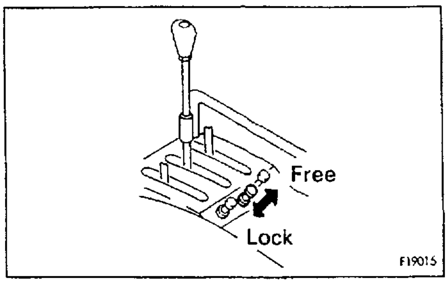
This is used to operate the main winch.

Position ①: Wind out
Position ②: Wind in
N: Neutral
Swing free switch Ⓐ: If this switch is pressed when winding in a load, the boom will move in the direction of swing to a position immediately above the load.

REMARK

Use this when the swing switch is at the LOCK position.
If the lever is at an operating position, and it is released, it will return to the N position.
(A type where it is held at the same position is available as an option. When this option is used, return the lever manually to the N position.)

7. MAIN WINCH CONTROL LEVER LOCK PIN



⚠ WARNING

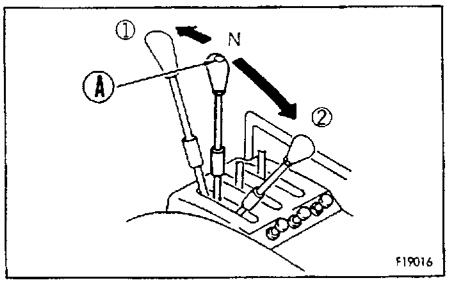
When not using the main winch, always place the lever at the neutral position and apply the lock.

This pin is used to lock the main winch control lever.

REMARK

When setting to the FREE position, pull up until the lock pin stops.
When applying the lock, push the lock pin down and check that the winch control lever is locked.

8. AUXILIARY WINCH CONTROL LEVER



⚠ WARNING

When winding in a load, operate swing free switch Ⓐ when the load comes off the ground, and release the switch after the load is clear of the ground.

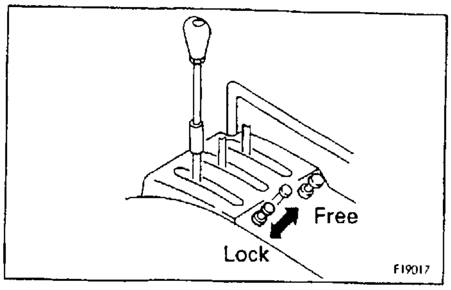
This is used to operate the auxiliary winch.

Position ①: Wind out
Position ②: Wind in
N: Neutral
Swing free switch Ⓐ: If this switch is pressed when winding in a load, the boom will move in the direction of swing to a position immediately above the load.

REMARK

Use this when the swing switch is at the LOCK position.
If the lever is at an operating position, and it is released, it will return to the N position.
(A type where it is held at the same position is available as an option. When this option is used, return the lever manually to the N position.)

9. AUXILIARY WINCH CONTROL LEVER LOCK PIN



⚠ WARNING

When not using the auxiliary winch, always place the lever at the neutral position and apply the lock.

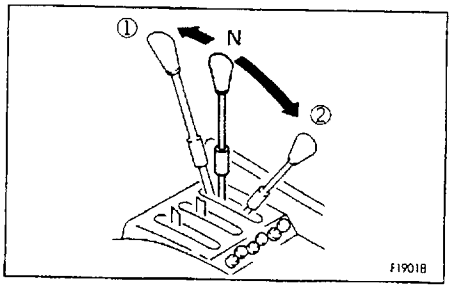
This pin is used to lock the auxiliary winch control lever.

REMARK

When setting to the FREE position, pull up until the lock pin stops.

When applying the lock, push the lock pin down and check that the winch control lever is locked.

10. POWER TILT JIB CONTROL LEVER



⚠ WARNING

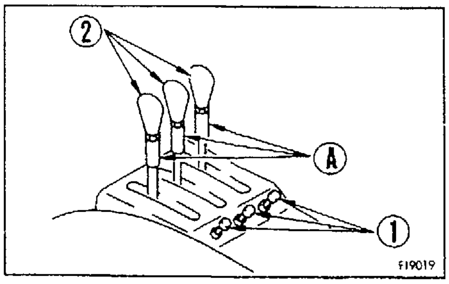
- **When operating the tilt with a raised load, run the engine at idling and carry out the operation slowly.**
- **When lowering the jib, the working radius will become larger, so be careful not to cause any overload.**
- **Do not pull the load sideways or pull it in by raising the jib.**

This lever is used to tilt the jib.

Position ①: Tilt LOWER
Position ②: Tilt RAISE
N: The jib is stopped and held at the same position.

REMARK

Main winch control lever 6, auxiliary winch control lever 8, and power tilt jib control lever 10 can be adjustedin the following three ways.



Adjusting lever height

Loosen intermediate ring Ⓐ, set lever ② to the desired position, then tighten ring Ⓐ again.

Adjusting lever neutral position

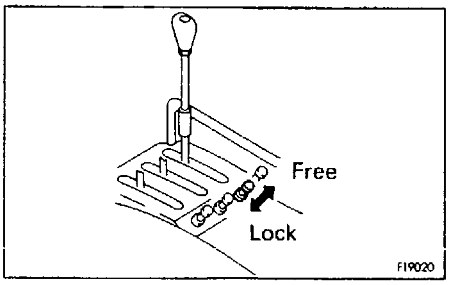
1. Insert lock pin ①.
2. Push down winch lever ② until it contacts the stopper, keep it pushed in, and move it to the desired position, then release lever ②.
3. Move lever ② to the front and rear, and the position where lever ② comes back up and stops moving is the newly set neutral position.
4. When lock pin ① is raised and set to the FREE position, lever ② can be operated.

Adjusting position of lever for getting on and off machine

It is possible to tip lever ② back to the rear to prevent it from being in the way when the operator gets on or off the machine.

1. Insert lock pin ①.
2. Push down winch lever ② until it contacts the stopper, keep it pushed in, then tip it back to the rear.

11. POWER TILT JIB CONTROL LEVER LOCK PIN



> ⚠ WARNING
>
> **When not using the power tilt jib, always place the lever at the neutral position and apply the lock.**

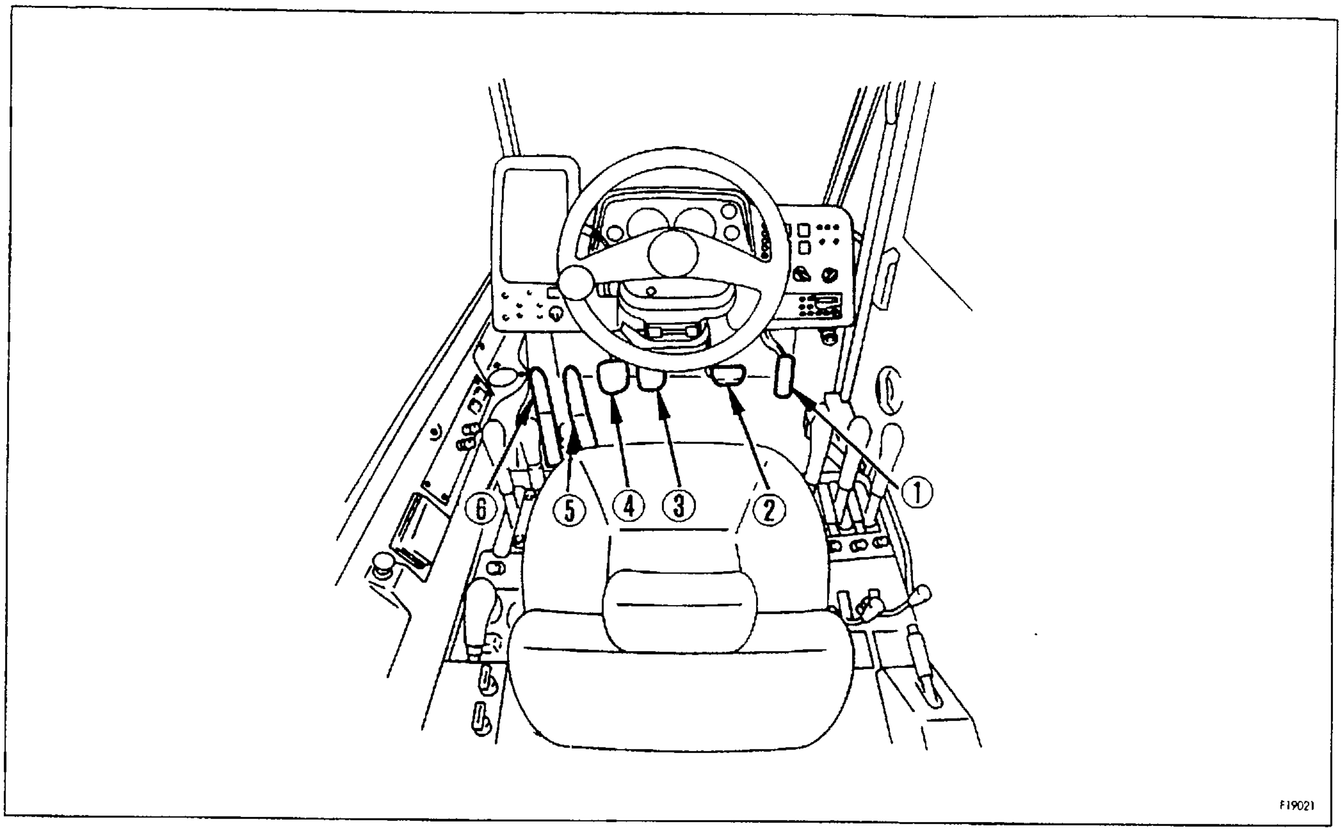
This pin is used to lock the power tilt jib control lever.

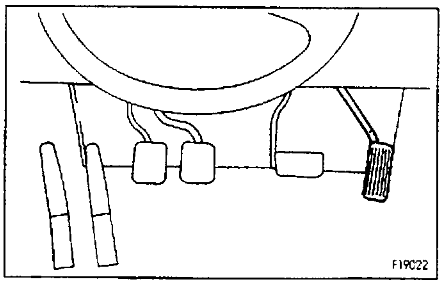
REMARK

When setting to the FREE position, pull up until the lock pin stops.

When applying the lock, push the lock pin down and check that the winch control lever is locked.

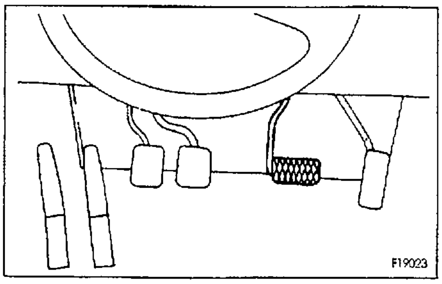
11.5 PEDAL GROUP





1. ACCELERATOR PEDAL

This is used to adjust the engine speed.
This pedal can be operated freely to adjust the engine speed from low idling to high idling.



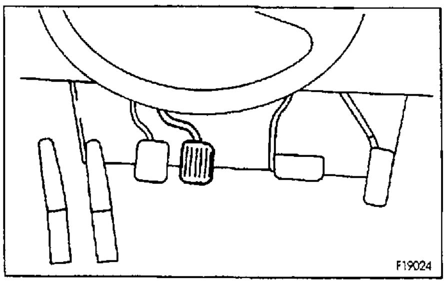
2. BRAKE PEDAL

⚠ WARNING

Do not put your foot on this pedal unless necessary.

This is used to brake the machine when traveling.

3. MAIN WINCH BRAKE PEDAL


F19024

⚠ WARNING

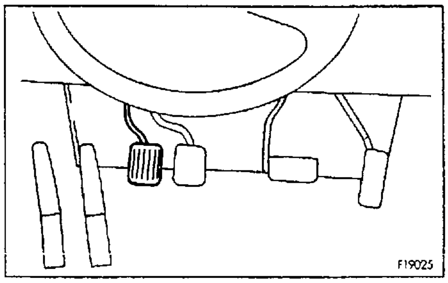
When moving the clutch lever from the OFF position to the ON position, always operate the lever fully to the rear and check that it is at the ON position, then slowly release the winch brake pedal.
When releasing the pedal, apply the lock to the clutch lever.

This pedal is used to brake the main winch.
Use the brake pedal to control the down speed during free-fall operations.

NOTICE

During normal operations, when operating the main winch clutch lever, always keep your foot on the main winch pedal to control the movement.

4. AUXILIARY WINCH BRAKE PEDAL


F19025

⚠ WARNING

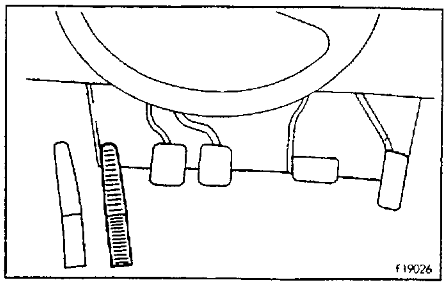
When moving the clutch lever from the OFF position to the ON position, always operate the lever fully to the rear and check that it is at the ON position, then slowly release the winch brake pedal.
When releasing the pedal, apply the lock to the clutch lever.

This pedal is used to brake the auxiliary winch.
Use the brake pedal to control the down speed during free-fall operations.

NOTICE

During normal operations, when operating the auxiliary winch clutch lever, always keep your foot on the auxiliary winch pedal to control the movement.

5. HOIST PEDAL

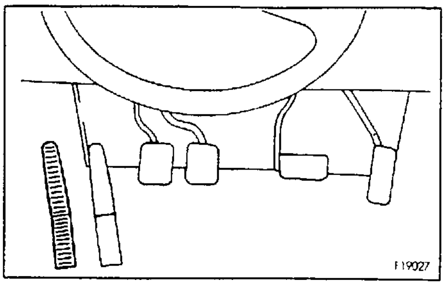


⚠ WARNING

Do not put your foot on this pedal unless necessary.

This pedal is interconnected with the boom hoist lever.

6. TELESCOPE PEDAL

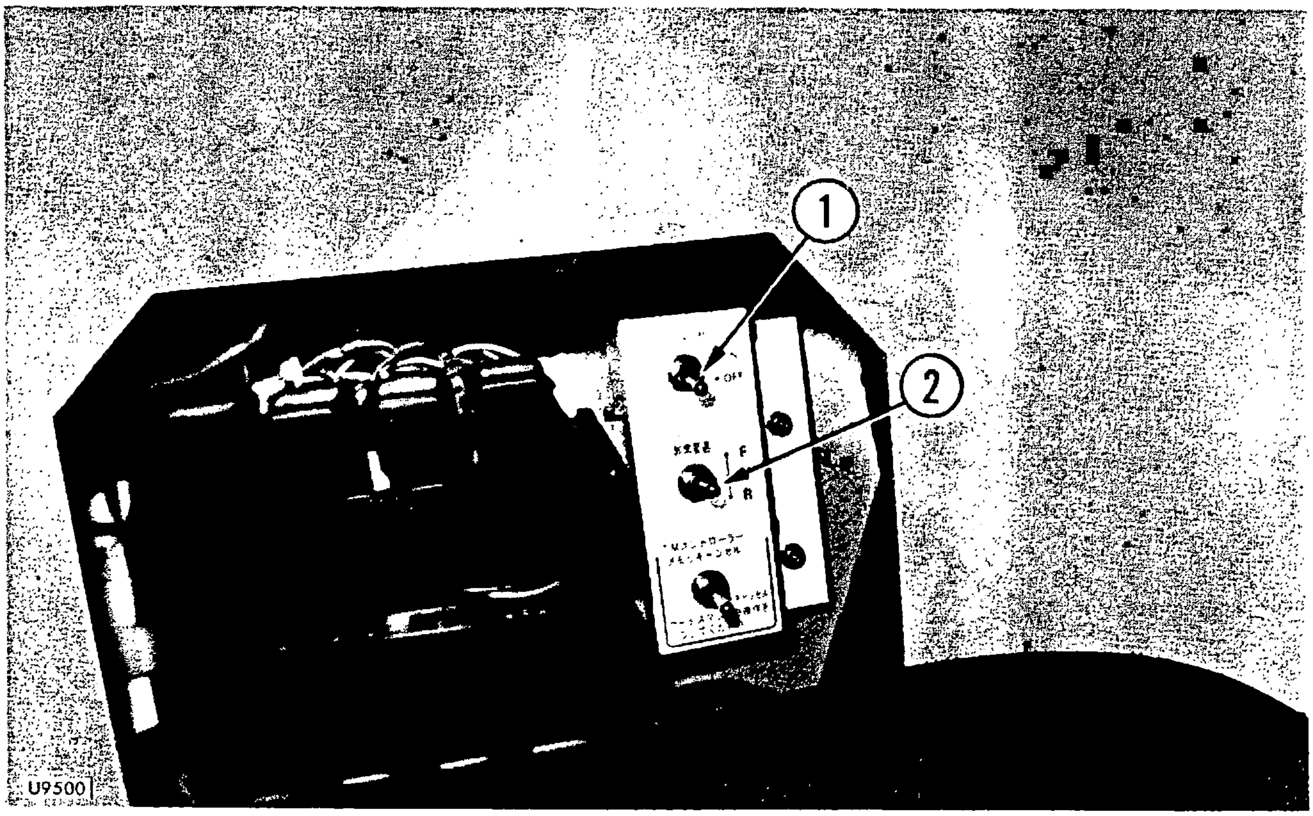


⚠ WARNING

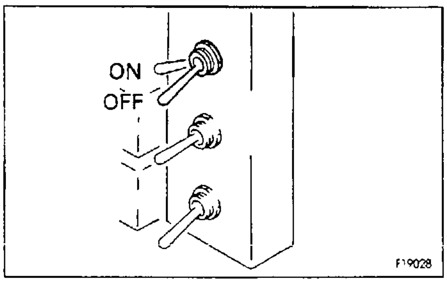
Do not put your foot on this pedal unless necessary.

This pedal is interconnected with the boom telescope lever.

11.6 LEFT REAR COVER GROUP



1. EMERGENCY GEAR SHIFT SELECTOR SWITCH

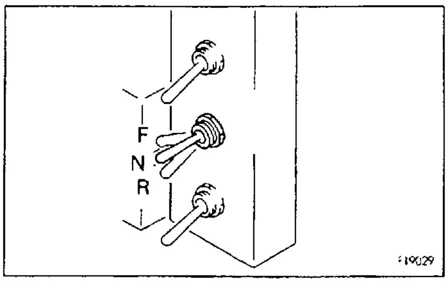


If there is any abnormality in the gear shift lever or transmission shift controller, and the machine cannot travel normally, turn this switch ON, then operate the emergency gear shift switch.

REMARK

When the emergency gear shift switch is turned ON, the MDT lamp will light up. When the condition returns to normal, turn the switch OFF.

2. EMERGENCY GEAR SHIFT SWITCH

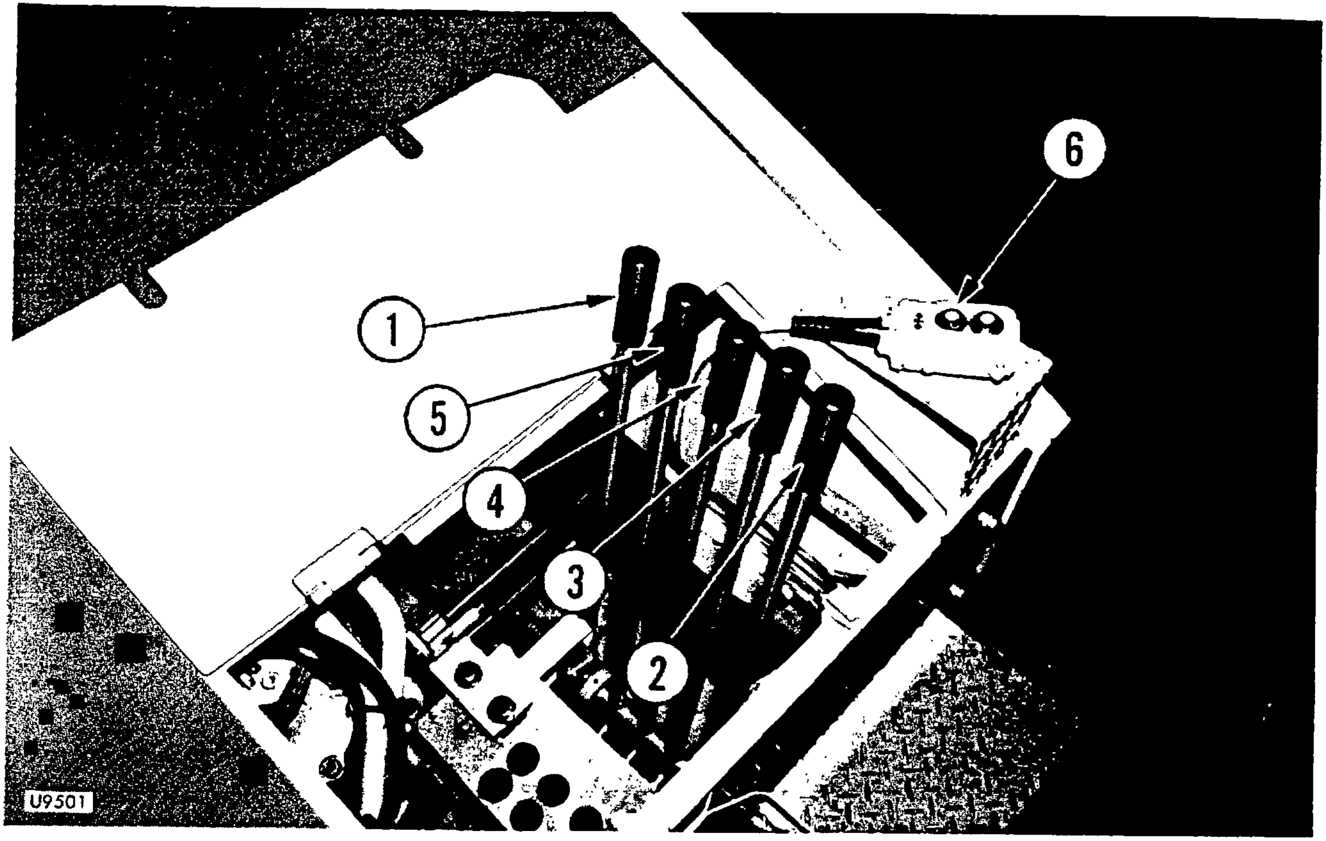


After the emergency gear shift selector switch is turned ON, the machine can be driven if this switch is set to the F position or R position.
The gear range is the 2nd speed for torque converter travel.

NOTICE

There is a TM controller memory cancel switch under the emergency gear shift switch, but do not operate this switch. Only the serviceman should operate this switch.

11.7 EXTERNAL CONTROL GROUP

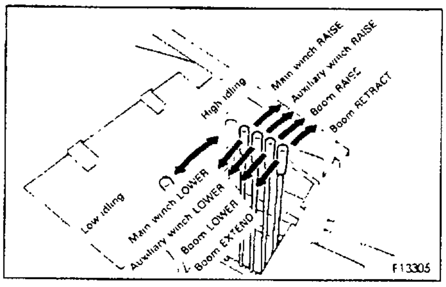


1. **ACCELERATOR LEVER**
2. **BOOM TELESCOPE LEVER**
3. **BOOM HOIST LEVER**
4. **AUXILIARY WINCH LEVER**
5. **MAIN WINCH LEVER**

⚠ WARNING

These levers are removable. When they are not being used, stow the levers away, close the cover, and lock it securely.

These levers can be used to operate the work equipment from outside the machine when extending or stowing the jib.
Use them for installing and stowing the jib.

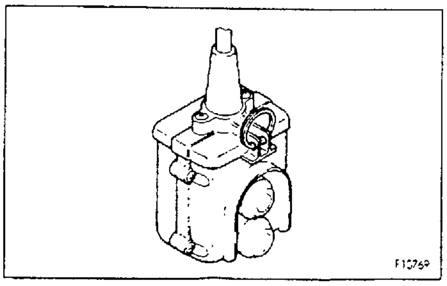


6. **JIB WINCH CONTROL SWITCH**

⚠ WARNING

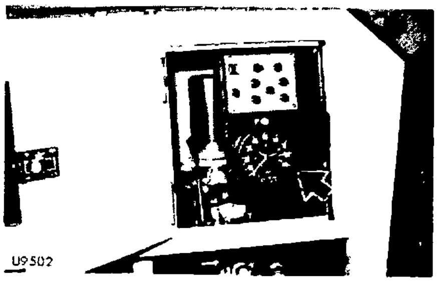
- **When not using this switch, always stow it in the storage box.**
- **Do not press the UP and DOWN buttons at the same time.**

This is used to control the jib winch when extending or stowing the jib.



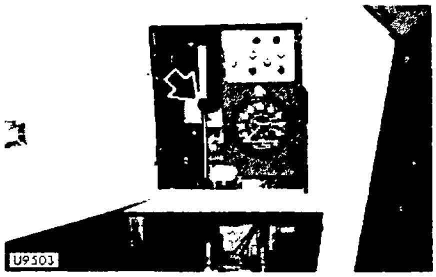
11.8 TACHOGRAPH

This displays the time, travel speed, and travel distance.
A clock and speedometer are included in the unit, and the records for the travel speed, travel distance, and operator shifts (distinguished by the key) can be printed out on the paper.


U9502

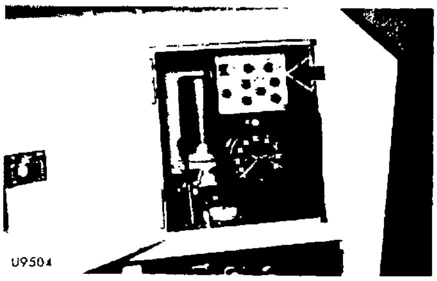
11.9 ACCELERATOR LEVER

This is used to adjust the engine speed.
When the external outrigger control switch is being used, this lever can be used to adjust the outrigger speed.

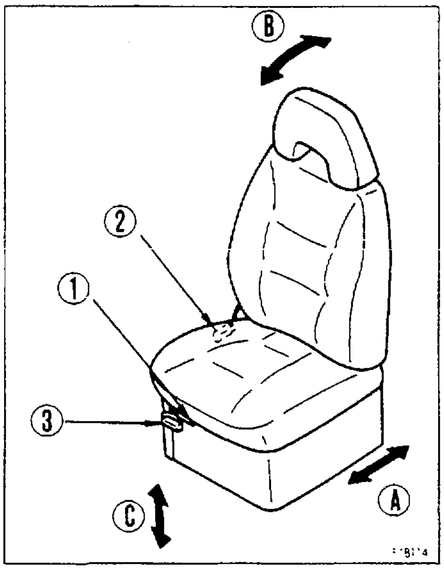

U9503

11.10 OUTRIGGER CONTROL PANEL

This is used to operate the outrigger from outside the operator's compartment.
For details of operation, see "12.17 OUTRIGGER OPERATION".


U9504

11.11 OPERATOR'S SEAT

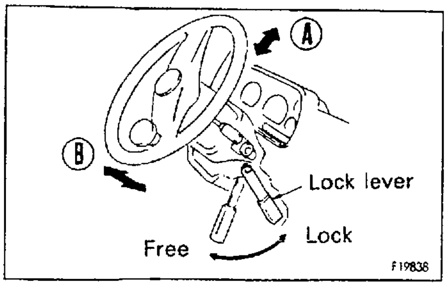


Ⓐ Fore-and-aft adjustment of seat
Move lever ① to the right, set the seat to the desired position, then release the lever.
Amount of fore-and-aft adjustment: 140 mm (5.5 in) (7 stages)

Ⓑ Adjusting reclining angle
Pull lever ②, set the seat back to the desired position, then release the lever.

Ⓒ Adjusting seat height and tilt
Pull lever ③ up or down to set the seat to the desired height. Push down to adjust the height at the front, and pull up to adjust the height at the back.
Amount of adjustment: 65 mm (2.6 in) (6 stages) (at front and rear)

11.12 STEERING WHEEL



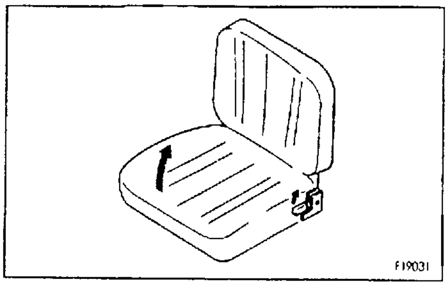
WARNING

After adjusting, set the lock lever securely to the LOCK position.

If the lock lever is set to the FREE position, the angle and height of the steering wheel can be adjusted.

Ⓐ Adjustment amount for angle: 8°
Ⓑ Adjustment amount of height: 30 mm (1.2 in)

11.13 ASSISTANT'S SEAT

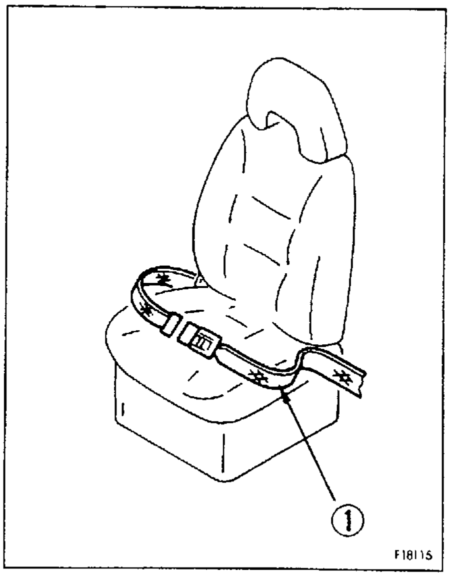


Pull the lever up, and the seat will go up. Use this when you want to recline the main operator's seat fully.

11.14 SEAT BELT

WARNING

- **It is dangerous to fit or adjust the seat belt when traveling. Always put on the seat belt and adjust it before starting to travel.**
- **Always fit the lap belt so that it is across your hips. If you fit it across your stomach, there is danger of a powerful force being applied in the case of an accident.**



- **Method of fitting**

1. Check that belt ① is not twisted, then insert the tongue into the buckle securely until there is a click.
2. Set the belt and plate straight, then pull the belt to adjust.

- Method of removing

1. Press the red button on the buckle to release the belt.

11.15 FUSE BOX

NOTICE

When replacing the fuse, always turn off the power (turn the starting switch to the OFF position).

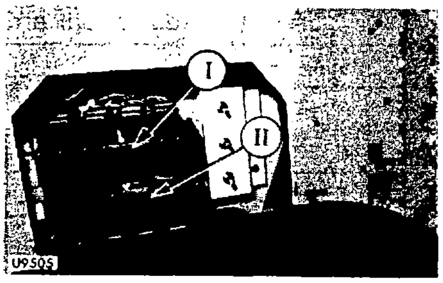
The fuses protect the electrical components and wiring from burning out.
If the fuse is corroded, or there is white powder on it, or the fuse is loose in the fuse holder, replace it.

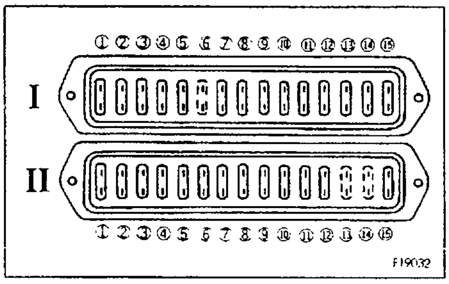
When replacing the fuse, always replace it with a fuse of the same capacity.

11.15.1 FUSE CAPACITY AND NAME OF CIRCUIT

- **FUSE BOX I, II (INSIDE CAB)**

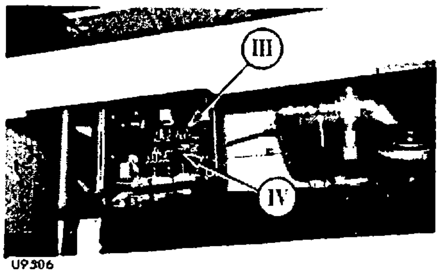
No.	Fuse box I		Fuse box II	
	Capacity	Name of circuit	Capacity	Name of circuit
1	10A	Starting motor	5A	Jib
2	10A	Lighting	5A	Oil cooler
3	5A	Horn	10A	MDT
4	20A	Heater (primary)	10A	Swing FREE, jib EXTEND
5	10A	Room lamp, turn pilot	10A	Work lamp
6	–	Option	5A	Gauge
7	20A	Cooler (primary)	10A	Cigar lighter
8	5A	Emergency gear shift selector	5A	Brake
9	10A	PTO operation	5A	Suspension
10	5A	Radio	5A	4WD ALC
11	10A	Swing flasher	5A	Parking
12	5A	Work lamp	5A	Emergency system
13	5A	Blower	–	Option
14	20A	Wiper	–	Option
15	10A	Cooler (secondary)	10A	Travel

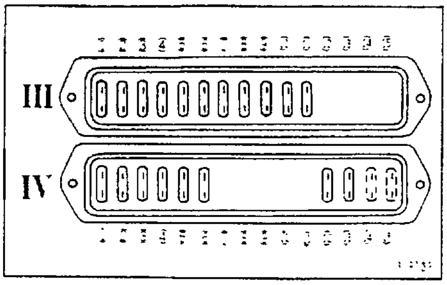




- **FUSE BOX III, IV (ABOVE FUEL TANK)**

No.	Fuse box III		Fuse box IV	
	Capacity	Name of circuit	Capacity	Name of circuit
1	(5A)	Option (retarder)	(5A)	Option
2	(5A)	Option	10A	Turn signal
3	(5A)	Option	10A	Side lamp
4	10A	Backup lamp	10A	Tachograph, greasing
5	20A	Head lamp	5A	MDT
6	–	Option (service lamp)	10A	Engine stop motor
7	10A	MDT	–	–
8	5A	Stop lamp	–	–
9	5A	Rear steering lock	–	–
10	(5A)	Option (air dryer)	–	–
11	5A	Speed sensor amp	–	–
12	–	–	5A	Model selection W
13	–	–	5A	Model selection X
14	–	–	(5A)	Model selection Y
15	–	–	(5A)	Model selection Z





REMARK

The fuse (5A) for the MDT troubleshooting modes (Y) and (Z) go into Nos. 14 and 15 of fuse box IV on top of the fuel tank, so do not use these slots for any other purpose.

11.15.2 PRECAUTIONS WHEN ADDING ELECTRICAL COMPONENTS

⚠ WARNING

If the electrical component system is changed, there is danger that some abnormality may occur in the machine control. Please have any electrical components installed by your Komatsu distributor.

When adding electrical components, please contact your Komatsu distributor.

11.15.3 SLOW BLOW FUSE

A slow blow fuse, which acts in the same way as an ordinary fuse, is installed in the power source circuit from the battery.
If there is no abnormality in the fuse but the following problems occur, the slow blow fuse has melted, so check for the cause of the problem, and carry out any necessary repairs before replacing the slow blow fuse.

- **SYMPTOMS WHEN SLOW BLOW FUSE MELTS**

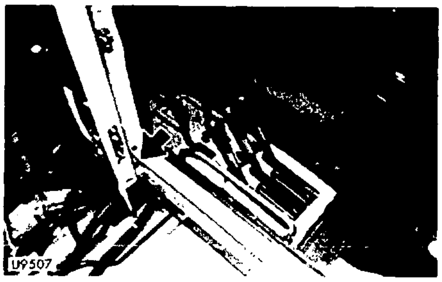
1) When the starting switch is turned to the ON position, the battery relay is not switched.
2) When the clearance lamp, room lamp, horn, or hazard lamp switches are turned ON, the lamps do not light up or the horn does not sound. When the radio switch is turned on, no sound comes from the radio.

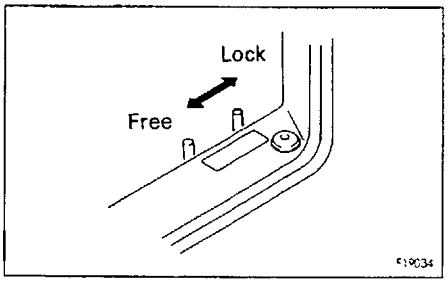
- **ASSEMBLY POSITION OF SLOW BLOW FUSE**

The slow blow fuse is in the battery relay (2 places) inside the battery relay box.
(The battery relay secondary side and the battery direct line.)

11.16 DOOR OPEN LOCK

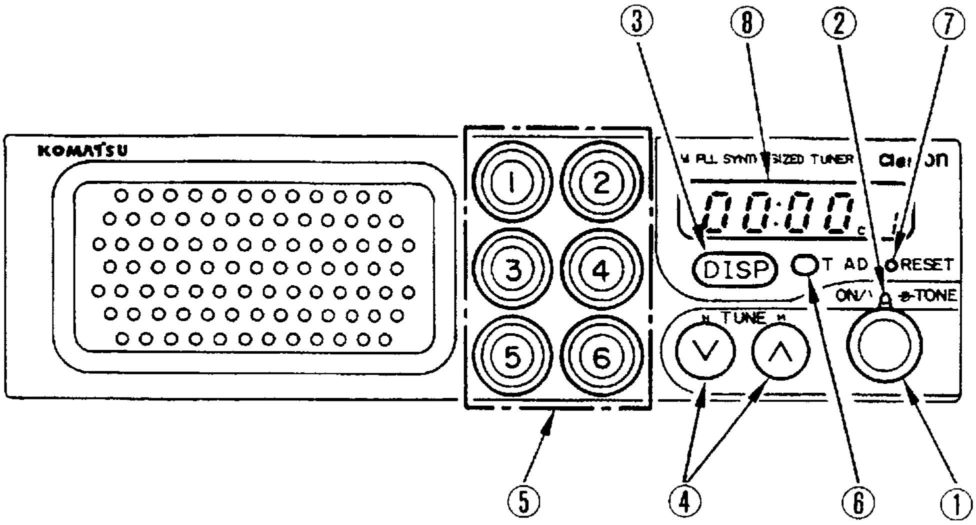
This is used to hold the door open.



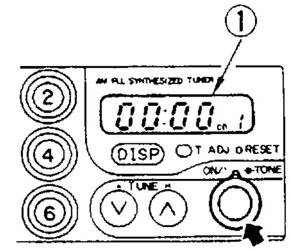


11.17 CAR RADIO

11.17.1 EXPLANATION OF PARTS



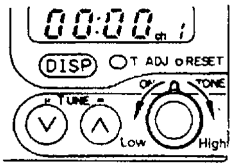
1. POWER SWITCH/VOLUME CONTROL KNOB (PUSH ON/VOL)



Push this knob to switch the radio on. The lighting in display area ① will light up and the frequency will be displayed. Press again to switch the power off.

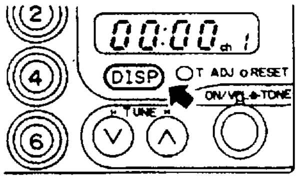
Turn the knob clockwise to increase the sound, and counterclockwise to reduce it.

2. TONE CONTROL KNOB (TONE)



Turn this knob clockwise from the center position to emphasize the high sounds, and counterclockwise to emphasize the low sounds.

3. DISPLAY BUTTON (DISP)



If the display button is pressed when the radio is being used, the frequency of the station being listened to is displayed for 5 seconds.

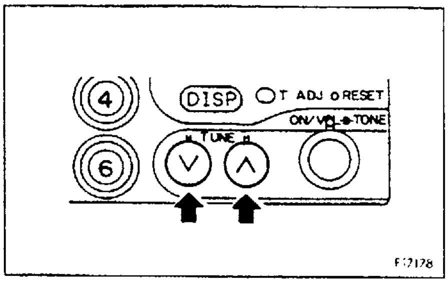
4. TUNING/HOUR, MIN ADJUSTMENT BUTTON (TUNE)

This is used to select the station or change the frequency.

If the station UP button Λ is pressed, the frequency will go up by 9 kHz each time it is pressed; if the station DOWN button V is pressed, the frequency will go down 9 kHz each time it is pressed.

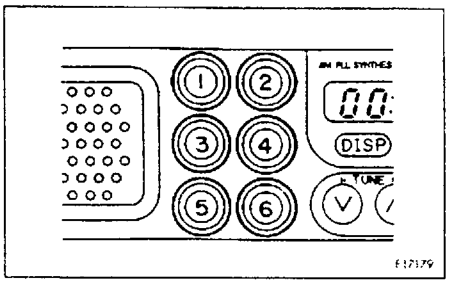
If these buttons are kept pressed for more than 2 seconds, the station will be selected automatically.

When adjusting the time, these change the hour display and minute display.



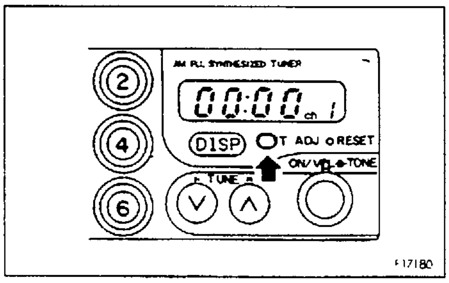
5. PRESET BUTTON (1, 2, 3, 4, 5, 6)

These buttons can be used to program the desired broadcasting stations. It is then possible to select the station at a touch.



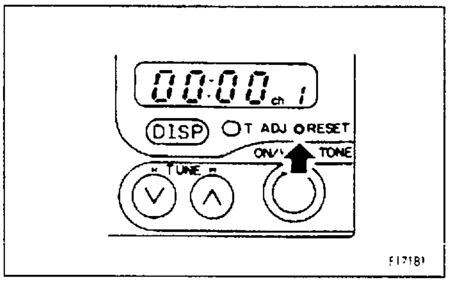
6. TIME ADJUSTMENT BUTTON (T.ADJ)

Press this button to adjust the time.



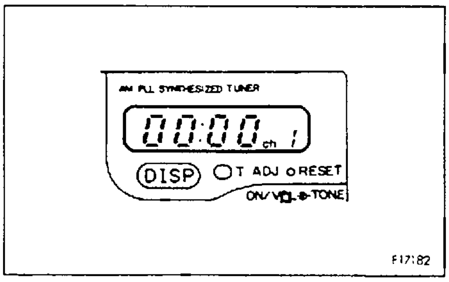
7. TIME RESET BUTTON (RESET)

Press this button to reset to the exact hour.



8. DISPLAY

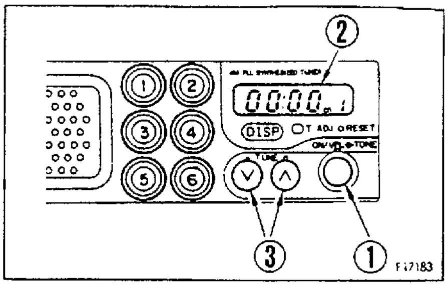
This displays the frequency, time, and preset symbols.



11.17.2 METHOD OF USE

Method of setting preset buttons

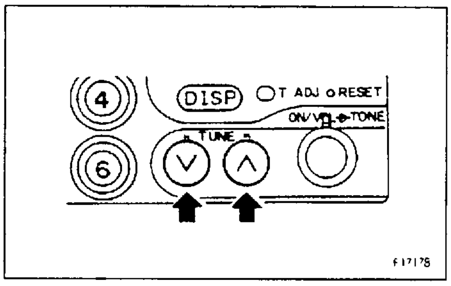
1. Press power switch ①. The frequency is displayed in display area ②.
2. Use selector button ③ (Λ or V) to adjust to the desired frequency.
3. Choose a preset button to use for this station, and keep it pressed for at least 2 seconds to program the button to that frequency.
   When the sound suddenly disappears and appears again, the button is programmed, and the preset number is shown in display area ②.
   After programming the button, press the preset button and release it within approx. 2 sec. The station programmed to that button will be selected for reception.
   It is possible to program one station for each preset button.



Method of manual tuning

Press the tuning button lightly to adjust to the desired frequency. Each time the button is pressed, the frequency will change by 9 kHz.

Λ button: Select station at higher frequency
V button: Select station at lower frequency



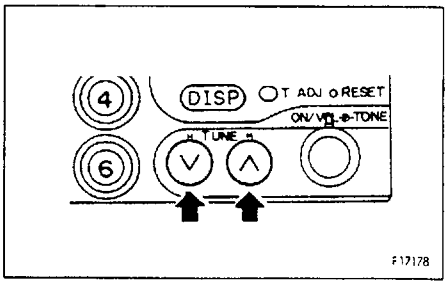
Method of automatic tuning

Keep the tuning button pressed for at least 2 seconds and then release it. When reception from a broadcasting station is picked up, the selector will automatically stop at that position.

When searching for the next station, keep the selector button pressed again for at least 2 seconds.

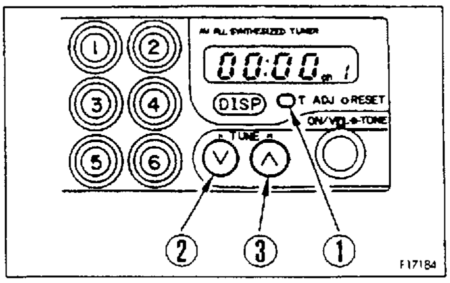
Λ button: Select station at higher frequency
V button: Select station at lower frequency

If the reception is weak, and stations are not found, adjust the frequency manually to select the desired station.



Adjusting time

1. Keep T.ADJ button ① pressed, and press H button ②.
   The hour display will change, so when it reaches the correct hour, release the button.
2. The T.ADJ button ① pressed and press M button ③.
   The minute display will change, so when it reaches the correct time, release the button.

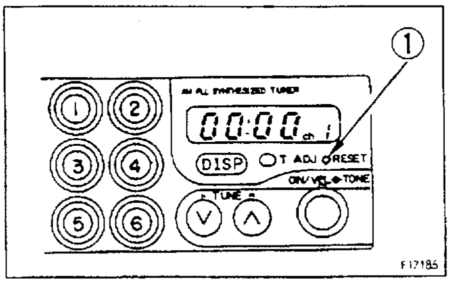


F17184

Method of using RESET button

If RESET button ① is pressed at the same time as the time signal or standard time, the display will return immediately to the exact hour (0 hour 00 min) .

If the display is 01 – 29 min, the display will go back to 0 min.
If the display is 30 – 59 min, the display will advance to 0 min.



F17185

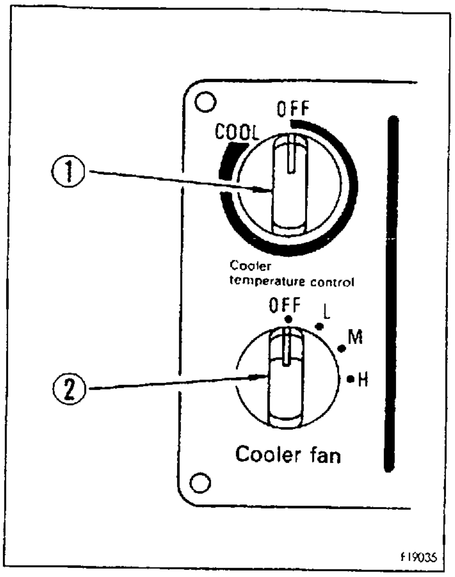
[Example]
10:29 → 10:00 (return to exact hour)
10:30 → 11:00 (advances to exact hour)

11.17.3 PRECAUTIONS WHEN USING

- Retract the antenna when traveling in places with a low overhead height.
- For safety reasons, when operating keep the sound to a level where you can enjoy the sound but still hear the sound from outside vehicles.
- If water gets inside the speaker case or car radio (auto tuning), it may cause a serious problem, so do not let water get on these parts.
- Do not wipe the knobs or buttons or any other parts with any solvent such as benzene or thinner. Always wipe with a soft dry cloth (in cases of extreme dirt, use alcohol on the cloth).

11.18 CAR COOLER

11.18.1 NAMES OF PARTS ON CONTROL PANEL



1. THERMO SWITCH

This adjusts the temperature of the cold air.

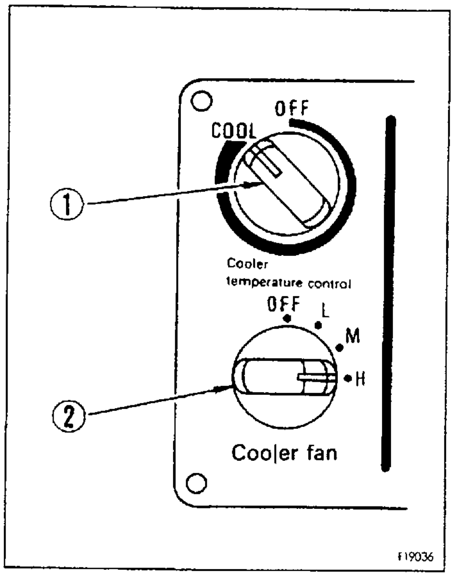
- The more the switch is turned from the OFF position towards the COOL position, the colder the air becomes.
- If the switch is turned to the OFF position, the cooler will stop. If the fan switch is ON, only ordinary air will blow out.

2. FAN SWITCH

This acts as the fan control and the main switch for the cooler.

- The fan speed can be switched to the three levels: L, M, H.
- When this switch is turned to the OFF position, the power is turned off and the cooler stops.

11.18.2 METHOD OF OPERATION

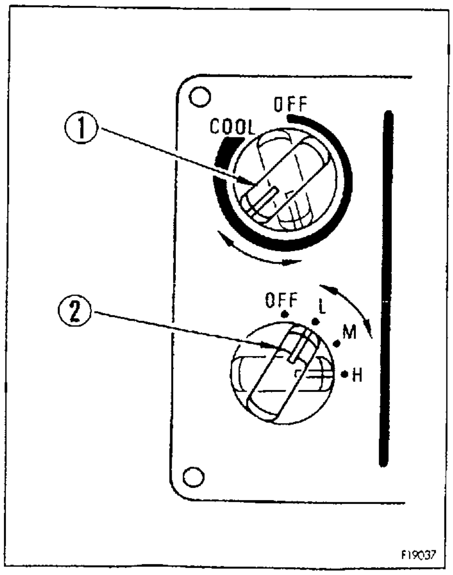


Rapid cooling

Set the switches in the positions shown in the diagram on the right to carry out rapid cooling of the operator's compartment.

- Set thermo switch ① to the COOL position.
- Set fan switch ② to the H position.

When using the cooler after the machine has been parked in the hot sun, first open the door and windows to cool the cab down, then switch the cooler on.



Normal use

Set the switches in the positions shown in the diagram on the right to remove the humidity and cool the inside of the cab to a pleasant temperature.

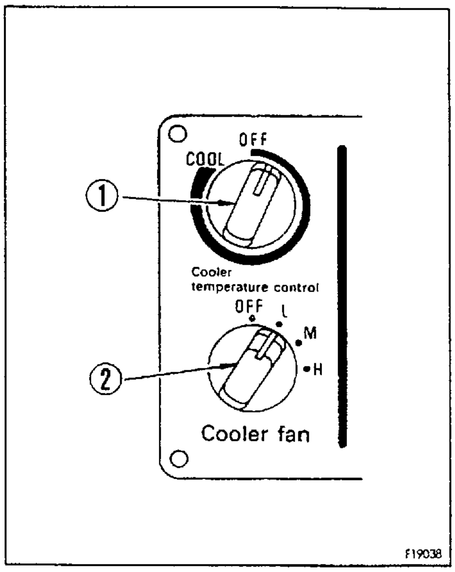
- Set thermo switch ① to the desired position.
- Set fan switch ② to the desired position.

If you have been smoking and the air inside the cab is smoky, open the door window to allow fresh air in.

Weak cooling

If it is humid and the window mists up, set the switches in the positions shown in the diagram on the right to remove the mist.

- Set thermo switch ① to near the OFF position.
- Set fan switch ② to the L position.



11.18.3 PRECAUTIONS WHEN USING

Observe the following precautions to make effective use of the cooler.

When machine has been parked in the hot sun

If the machine is left for a long time in the hot sun, the inside of the cab will become extremely hot. If this happens, open all the windows to release the hot air before switching on the cooler.

When the inside of the cab has become cooler, close the windows and set the cooler to the desired temperature.

When your eyes are irritated

If you smoke inside a sealed cab when the cooler is on, your eyes may become irritated. This is because the air inside the cab is dry, and as a result, the membranes of your eyes become dry and less resistant to irritation. If this happens, open the windows to let the smoke out and fresh air in.

When frost forms on the cooling equipment

If the compressor is rotating at high speed or if it is extremely humid, and the switch is set to H or L, frost may form on the cooling equipment and reduce the flow of cool air from the vents. If frost forms on the cooling equipment, turn the thermo switch so that it is close to the OFF position (only air blows out) to remove the frost.

Suitable cooling temperature

The cooler provides a pleasant environment by reducing the temperature and humidity.

Normally, it is considered the optimum condition for health reasons if it feels slightly cool (difference from the outside temperature: 5 – 6°C) when you enter a cooled cab. If it is too cold, it will be harmful in various ways to the health, so be careful to adjust the temperature to a suitable level.

NOTICE

Always turn the thermo switch ON AFTER starting the engine. Failure to do this may cause a breakdown of the cooler drive pump.

11.18.4 CHECKING REFRIGERANT (GAS) VOLUME

⚠ WARNING

The refrigerant use in the cooler is colorless and odorless, and is harmless in the atmosphere, but if the fluid gets into your eyes or on to your hands, it may cause loss of sight or frost bite, so never loosen any parts of the refrigerant circuit.

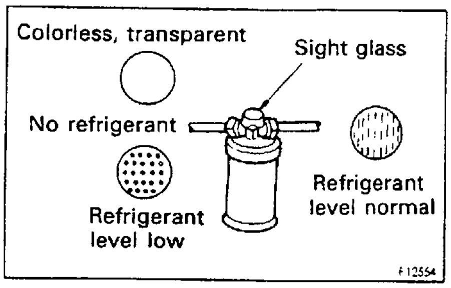
NOTICE

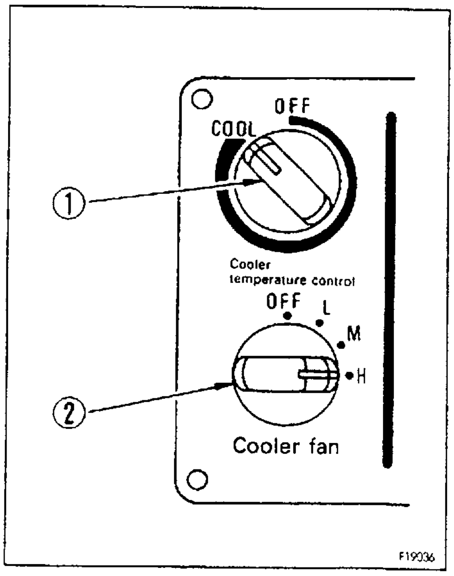
If the cooler is operated when it has run out of refrigerant, the compressor will be damaged, so be particularly careful to maintain the correct refrigerant level. If the equipment is left for a long time when the refrigerant has leaked out, rust will form inside the equipment.

If the level of the refrigerant (gas) is low, the cooling efficiency will become poor.
If the cooling efficiency is poor, the level of the refrigerant is probably too low, so check the level through the sight glass.

1. Set to the following condition.
- Engine speed: 2000 rpm
- Thermo switch: Maximum cooling
- Fan switch: H

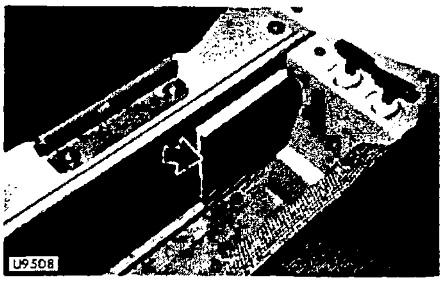
2. When the equipment is operated under the above conditions, there should be no bubbles visible in the sight glass.
   If there are bubbles, the level of the gas is too low, so contact your sales shop and have the equipment charged with gas.





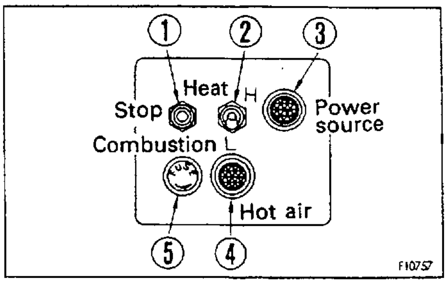
11.18.5 CLEANING AIR FILTER

If the air filter at the air intake is clogged, the cooling capacity will drop. Clean the air filter with compressed air once a week.



11.19 CAR HEATER

11.19.1 NAMES OF PARTS OF SWITCH PANEL



1. **HEATER MAIN SWITCH**
   This actuates the heater.

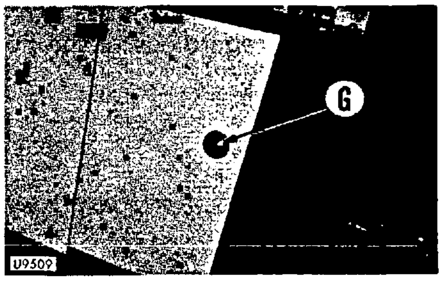
2. **HIGH-LOW SELECTOR SWITCH**
   This switches the combustion force. The air volume does not change.

3. **POWER SOURCE PILOT LAMP**
   This lights up when the operating switch is set to COMBUSTION and goes out when it is set to STOP.

4. **HOT AIR PILOT LAMP**
   This lights up when hot air is being blown out.

5. **FUSE BOX**

11.19.2 CHECKS BEFORE USE



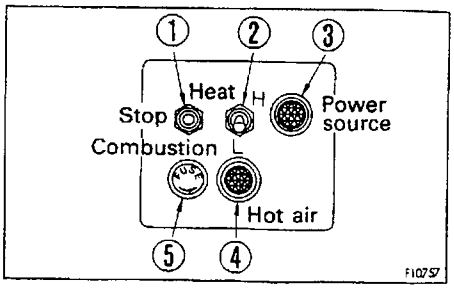
Check the following points before operating the heater.

- Check sight gauge Ⓖ to confirm that there is fuel (white kerosene) in the heater fuel tank.

  Heater tank capacity: 12 ℓ (3.2 US gal, 2.6 UK gal)

- Check that no gloves, cloth, or paper are left near the heater air intake port or hot air vents.

11.19.3 OPERATION



Before operating the heater, start the engine of the machine.

1. Turn main switch ① to the HEAT position and hold it at that position for approx. 30 seconds.

The main switch is a spring return type, so if it is released when at the HEAT position, it will return to the STOP position.

2. After carrying out preheating for 30 seconds, turn main switch ① to the COMBUSTION position.
   Power source pilot lamp ③ (red) will light up, and the equipment will be ready for ignition.

REMARK

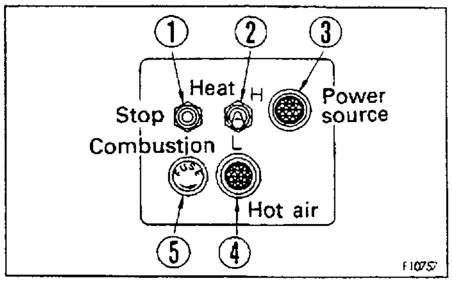
The heater will ignite within approx. 30 seconds after switching the main switch, and combustion will start. Three or four minutes after ignition, hot air pilot lamp ④ (milky white) will light up and pleasant heating will start.

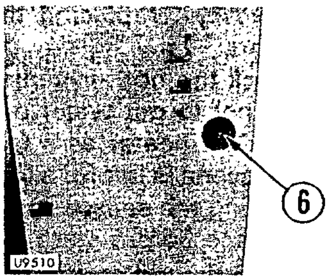
When the heater enters the ignition or combustion condition, do not turn main switch ① to the HEAT or STOP position until hot air pilot lamp ④ lights up.

3. When hot air pilot lamp ④ lights up, set the Hi-Low switch to the desired position.

The equipment will start ignition at LOW until hot air pilot lamp ④ lights up, regardless of the position of Hi-Low switch ②.

11.19.4 STOP





⚠ WARNING

If it should become impossible to stop the heater with main switch ①, tighten strainer valve ⑥ in the heater fuel tank to stop the flow of fuel. Check that the hot air changes to cold air and that the hot air pilot lamp goes out, then remove the fuse to stop the heater.
When using the heater again, check the cause of the problem and repair it before using the heater.

Turn main switch ① to the STOP position to stop the heater. Power pilot lamp ③ will go out, the fuel pump will stop, and combustion will stop.

Even after combustion stops, the motor will continue to turn for a short time to cool down the heater. When the temperature of the hot air is around 35°, the control thermo will be cut, and the motor will stop. Hot air pilot lamp ④ will go out to indicate that the heater has completely stopped.

While hot air pilot lamp ④ is lighted up, never turn the main switch to the HEAT or COMBUSTION positions.
In summer, if the machine is left for a long time in direct sunlight, and the temperature inside the operator's cab rises, the thermo switch may be actuated and the motor may start to turn. In this condition, there is absolutely no danger of fuel being discharged, but the battery power will be consumed, so when the heater season is finished, remove fuse ⑤.

Even when the starting switch is turned to OFF, the heater power source is not turned off.

11.19.5 REPLACING FUSE

If a fuse is blown, remove the fuse and replace it with a fuse of the same capacity (15A).

11. EXPLANATION OF COMPONENTS

11.19.6 PRECAUTIONS WHEN USING HEATER

⚠ WARNING

- **When entering a gasoline service station or other place where fires are prohibited, check first that the heater is completely stopped.**
- **Never use gasoline or diesel oil.**

- Do not use fuses or thermo fuses with a larger capacity, or any substitute. When replacing the fuse, always replace it with a genuine part.
- Do not block the hot air vents.
- Be careful not to get water on the heater.
- Do not use the heater as a fan.
- If white kerosene is left for a long time, its properties will change. When entering the season for using the heater, always fill it with fresh kerosene before starting to use the heater.

11.20 OSS EXTERNAL PILOT LAMP (OPTION)

⚠ WARNING

If the red external pilot lamp lights up, lower the load immediately and operate the machine in the direction of the safe zone.

This lamp indicates to the crane man and other operators in the area the condition of the load and the safety function cancel condition.

Item	Pilot lamp	Green	Yellow	Red
Load condition	Load ratio: Less than 90%	○		
	90% to 100%		○	
	More than 100%			○
Safety function	Overwinding			○
	Automatic stop cancel			○
	Jib setting mode			○

11.20.1 PRECAUTIONS WHEN USING EXTERNAL PILOT LAMP

⚠ WARNING

When traveling on public roads, remove the external pilot lamp.

- Use the external pilot lamp only inside the worksite.

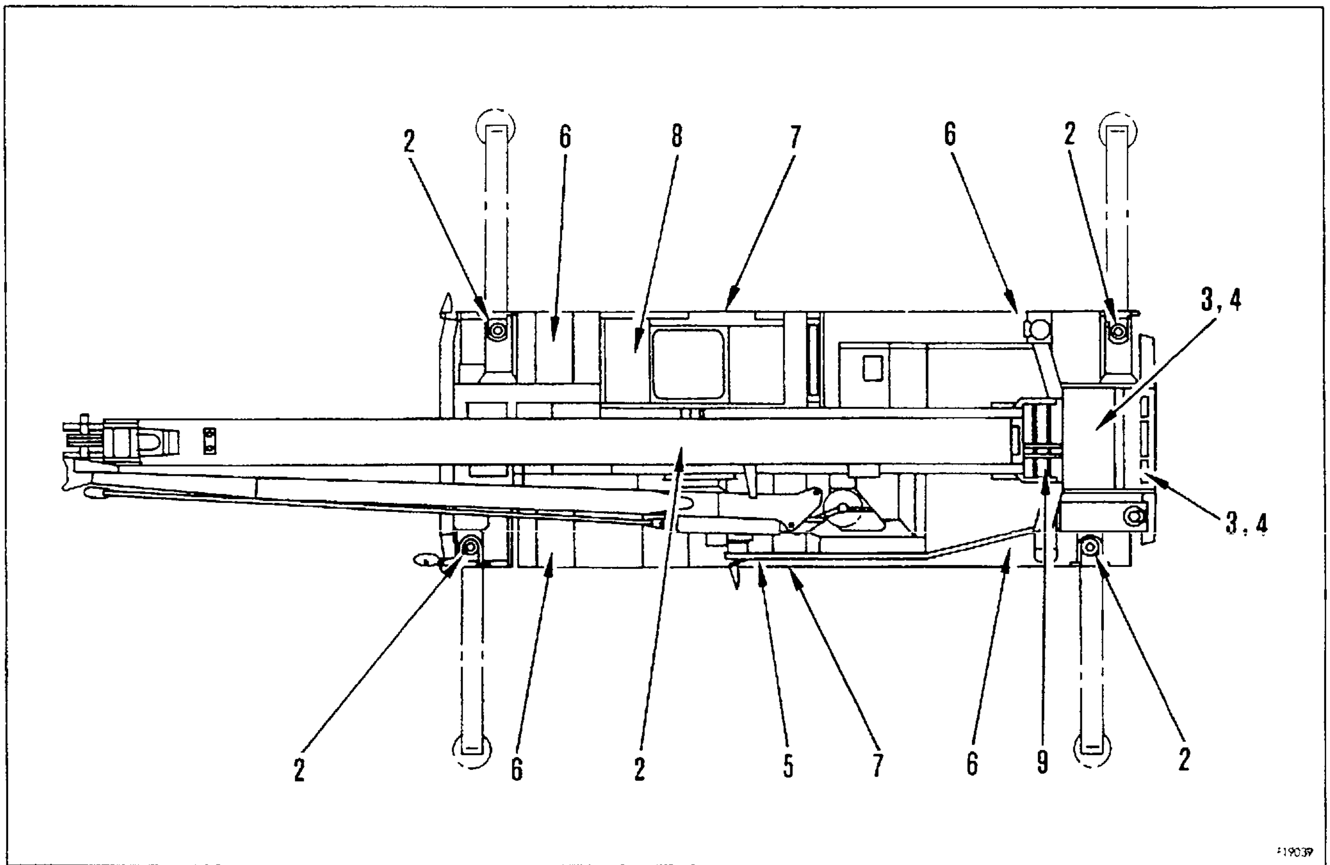
12.1 CHECK BEFORE STARTING ENGINE

12.1.1 WALK-AROUND CHECK

Before starting the engine, check around and under the machine for loose nuts and bolts, leakage of oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system. Check for any play or loose electric wires or dust collected at places with high temperatures.

> ⚠ WARNING
>
> **Dust, oil leakage, or fuel leakage around parts of the engine which are at high temperatures may cause fire.**
> **Check carefully and repair any abnormality, or contact your Komatsu distributor.**

The checks in this section are checks which are carried out once only each day before starting the engine for the first time.



1. **Check for broken sensors**

Check visually for any external damage to the boom length sensor, outrigger length sensor, and other sensor. If any abnormality is found, please contact your Komatsu distributor for inspection and repair.

2. **Check work equipment, cylinders, linkage, causes for damage, wear, and play**
   Check the work equipment, cylinder, linkage, and hoses for cracks, excessive wear, or play, and repair any abnormality.

3. **Remove dirt from around engine and radiator**
   Check for any accumulated dirt around the engine and radiator, and remove any dirt.

4. **Check for leakage of water or oil around engine**
   Check for any leakage of oil or coolant from the engine, and repair any abnormality.

5. **Check for oil leakage from hydraulic equipment, hydraulic tank, hoses, joints**
   Check for any oil leakage, and repair the location of the oil leakage if any abnormality is found.

6. **Check for damage, wear to tires, loose mounting bolts**
   Check for any cracks or peeling of the tires. Tighten any loose wheel nuts. If any abnormality is found, carry out repair or replacement.

7. **Check for damage to handholds and step, check for loose bolts**
   Repair any damage and tighten any loose bolts.

8. **Check for damage to gauges, monitor, check for loose bolts**
   Check for any damage to the gauges and monitors, and replace if any abnormality is found. Clean any dirt off the surface.

9. **Check for wear, damage to wire rope**
   Check the wire rope for wear, twisting, kinks, deformation, and corrosion, and replace with new wire rope if any abnormality is found.

12.1.2 CHECK BEFORE STARTING

The items in this section are carried out once only before starting the engine for the first time each day.

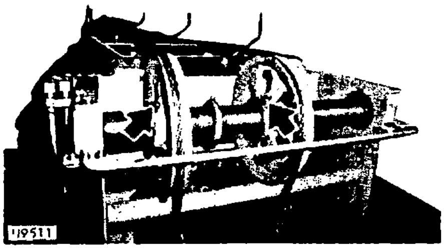
GREASING

1. Using a grease pump, add grease through the grease fittings marked by arrows.

2. After greasing, wipe off any old grease that is forced out.

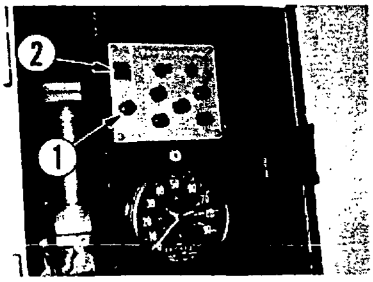
For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

1. Guide sheave (2 places)
   Slide so that the whole shaft of the guide sheave is coated with grease.



2. Bottom centralized greasing point (1 place)

- Tie rod pin
- King pin
- Steering cylinder pin
- Suspension cylinder pin
- Suspension spring hanger
- Suspension spring pin



(1) Push greasing switch ① at the side of the outrigger control panel on the left side of the machine.
(2) Lamp ② above switch ① lights up to indicate that greasing is completed, but keep switch ① pressed for a further 2 – 3 seconds.

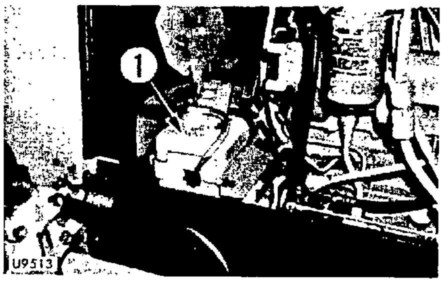
REMARK

- Check that there is grease in the grease cartridge before pushing the greasing switch.
- Always use the special cartridge for the grease.
- If the grease cartridge becomes empty, air will enter the piping. Replace the cartridge before this happens.

CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

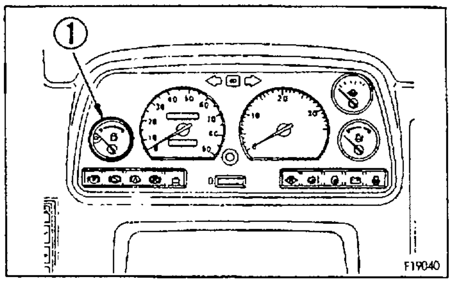
Normally, do not open the radiator cap. When checking the coolant, always wait for the engine to cool down, and check the sub-tank.

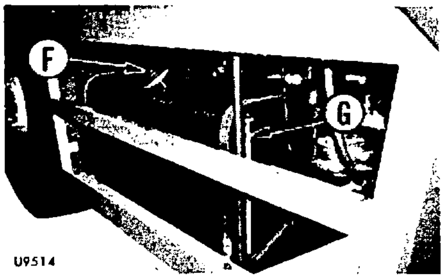


1. Open the engine side cover at the right side of the machine, and check that the coolant is between the FULL and LOW marks on sub-tank ①. If the level is low, add water to the FULL level through the water filler of sub-tank ①.
2. After adding water, tighten the cap securely.
3. If the sub-tank is empty, check for water leakage, then check the level of the water in the radiator. If the level is low, add water to the radiator, then add water to the sub-tank.

CHECK FUEL LEVEL

> **⚠ WARNING**
>
> **To prevent fire, make sure that the fuel does not overflow when you add fuel.**





1. Check the fuel level on fuel gauge ① or sight gauge Ⓖ.

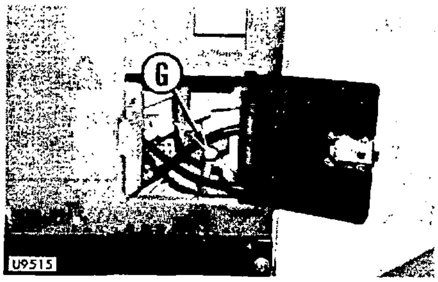
2. After completing operations, add fuel through fuel filler port Ⓕ to fill the tank.

   For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

3. After adding fuel, tighten the cap securely.

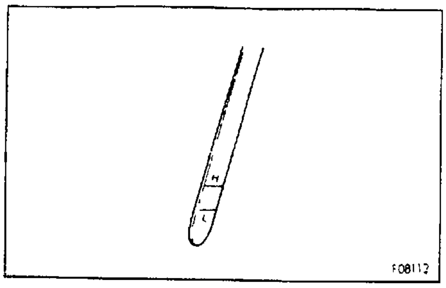
   Fuel tank capacity : 300 ℓ (79.2 US gal, 66.0 UK gal)

CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

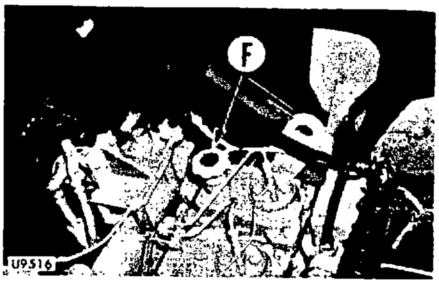


1. Open the right side cover of the engine.
2. Pull out dipstick Ⓖ and wipe the oil off with a cloth.
3. Insert dipstick Ⓖ into the oil filler guide again, then pull it out.
4. The oil level should be between the H and L marks on dipstick Ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler port Ⓕ. Swing the upper structure to the side when doing this.

   For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

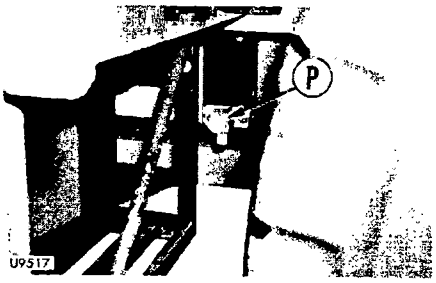


5. If the oil is above the H mark, drain the excessive engine oil from drain plug Ⓟ, then check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely.



REMARK

- When checking the oil level after operating the engine, stop the engine, then wait for at least 15 minutes before starting to check. When checking, make sure that the machine is not at an angle. Set it horizontal then check the oil level.
- When adding oil, remove dipstick Ⓖ from the gauge guide to release the air from the inside the crankcase.



CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

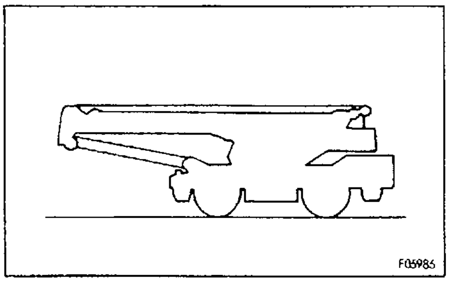
WARNING

- **When removing the oil filler cap, the oil may spurt out, so turn the cap slowly to release the internal pressure, then remove the cap carefully.**
- **When adding oil, if too much oil is added and the oil goes above the top line on the level gauge, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from drain plug Ⓟ.**

NOTICE

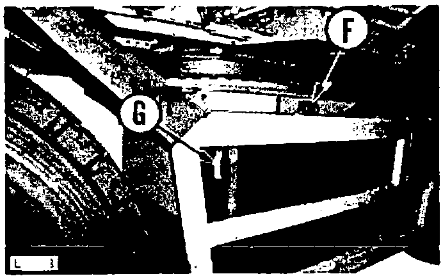
Do not add oil above the top mark. This will damage the hydraulic circuit and cause the oil to spurt out.

1. If the machine is not in the travel posture shown in the diagram on the right, start the engine, run the engine at low idling, set the machine to the travel posture, then stop the engine.
   For details of the travel posture, see "12.4 PREPARATIONS BEFORE MOVING MACHINE OFF".

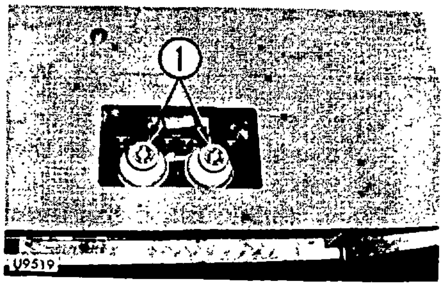


2. Check the oil level with sight gauge Ⓖ to confirm that it is between the top and bottom lines.
3. If it is below the bottom line, add hydraulic oil through oil filler port Ⓕ.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



CHECK TRAVEL BRAKE FLUID LEVEL, ADD FLUID



⚠ WARNING

When adding brake fluid, be careful not to mix mineral oil with the brake fluid. Even if only a small amount of mineral oil (engine oil, etc.) is in the brake fluid, the rubber parts in the brake fluid line will show an abnormal change in their properties, and this will lead to defective operation of the brakes. When adding brake fluid, always use a container that is used exclusively for brake fluid.

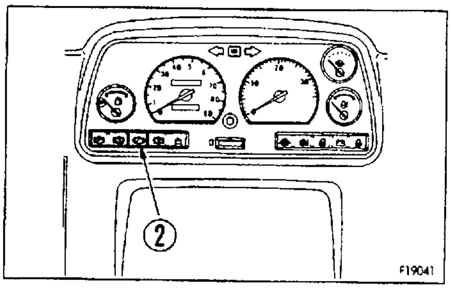
1. Check that the fluid level is at the MAX level in brake fluid tank ① (2 places).

2. If it is not up to the MAX level, add brake fluid (FMVSS DOT4 <Glycol type> or equivalent).

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

REMARK

If the fluid level is too low, brake oil level caution lamp ② in the meter portion lights up and the alarm buzzer sounds to warn the operator.
When adding brake fluid, be careful not to get the brake fluid on any painted surface. The brake fluid may attack the paint.

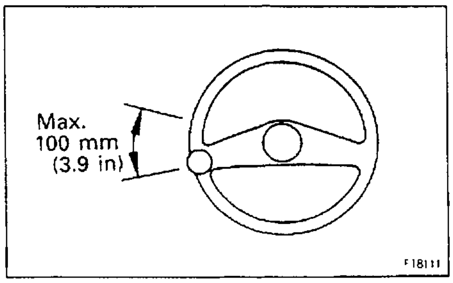


CHECK PLAY OF STEERING WHEEL

When measuring the play of the steering wheel, start the engine, and jack up the front wheels before measuring.

Standard: Max. 100 mm (3.9 in)

If the play is not within the standard, or the steering wheel vibrates abnormally or pulls or is heavy, please contact your Komatsu distributor for repair.



CHECK INFLATION PRESSURE OF TIRES

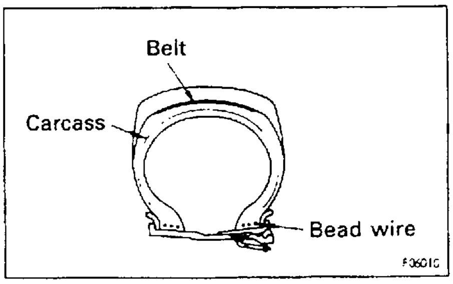
Measure the tire inflation pressure before starting operation when the tires are cold.
If the tire inflation pressure is too low, it will cause overload; if it is too high, it will cause cuts and shock bursts, so make sure that the tire inflation pressure matches the values in the table below.

	Inflation pressure		
When traveling	784.5 kPa	8.0 kg/cm²	113.6 psi
When working	784.5 kPa	8.0 kg/cm²	113.6 psi

REMARK

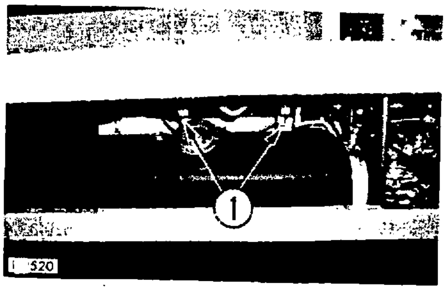
If the tire has any of the defects 1) to 5) listed below, it must be replaced with a new tire to ensure safety.

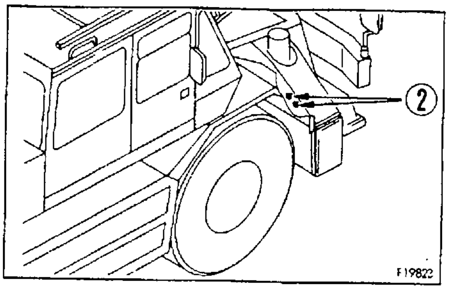
1) Tires where the bead wire is cut, bent, or greatly deformed
2) Tires with advanced wear, which show signs of slipping
3) Tires where the carcass or belts are damaged
4) Tires in which the ply or belt has separated
5) Tires which show deterioration, deformation, or growth in damage, and which are judged to be unable to withstand use



DRAIN WATER FROM AIR TANK

After finishing operations, stop the engine, then open drain valve ① in the dry tank and drain the water. In the same way, pull ring ② in the wet tank to drain the water.



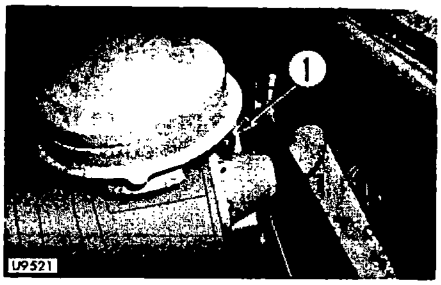


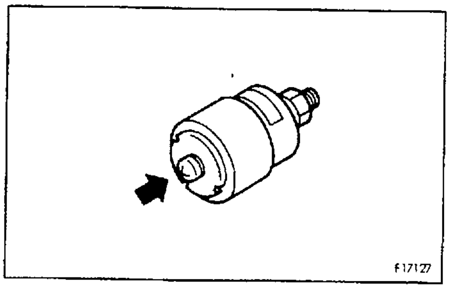
NOTICE

For machines equipped with an air dryer, check what is drained. If there is an abnormal amount of water or oil, replace the desiccant in the dryer or check for oil leaking up from the air compressor.

CHECK DUST INDICATOR

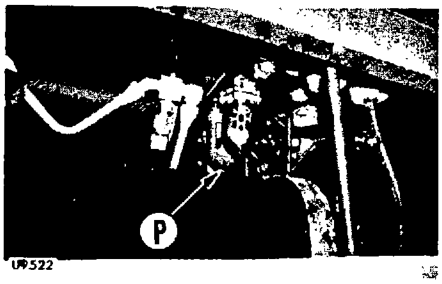
1. Check if the red piston has appeared in the clear portion of dust indicator ①.
2. If the red piston has appeared, immediately clean or replace the element.
   For details of the method of cleaning the element, see "23.2 WHEN REQUIRED".
3. After inspecting, cleaning, and replacing, press the knob of dust indicator ① to return the red piston to its original position.



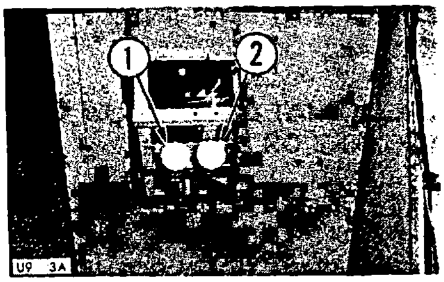


DRAIN WATER FROM AIR FILTER

Loosen drain plug Ⓟ at the bottom of the air filter to drain the water.



CHECK FLUID LEVEL IN SWING BRAKE, WINCH BRAKE, ADD FLUID



1. Check if the oil level can be seen at the MAX level of brake oil reservoir ① (for swing brake) and ② (for winch brake) at the rear of the cab.

2. If it is not up to the MAX level, add hydraulic oil.

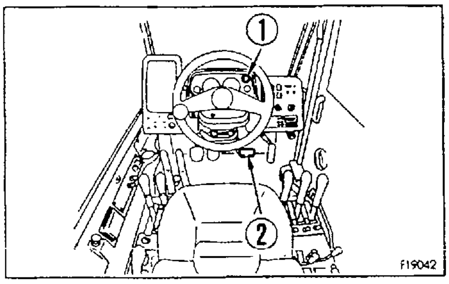
For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

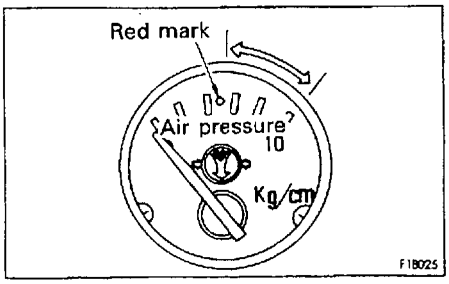
CHECK BRAKING EFFECT

The stopping distance should be a maximum of 12 m (39 ft) when the machine travels at an initial speed of 35 km/h on a flat, dry concrete surface.
If the braking effect is poor, see "23.6 EVERY 250 HOURS SERVICE".

CHECK RISE IN AIR PRESSURE, CHECK EXHAUST SOUND FROM BRAKE VALVE

When the pressure inside the air tank is 0, check that it takes approx. 5 minutes to charge with air up to the range marked by the arrow on air pressure gauge ① with the engine at low idling, and less than 1.5 minutes when the engine is running at high idling.
If the rise in pressure is too slow, check for any leakage from the piping, and check the operation of the air compressor. Check also that the exhaust sound is normal when air is exhausted from the brake valve when brake pedal ② is depressed and then released.





CHECK THAT FLASHING OF LAMPS IS NORMAL, CHECK FOR DIRT OR DAMAGE

CHECK THAT DIRECTION OF BACKUP MIRROR IS CORRECT, CHECK FOR DIRT OR DAMAGE

CHECK REFLECTORS AND NUMBER PLATE FOR DIRT OR DAMAGE

CHECK THAT HORN SOUNDS NORMALLY

CHECK THAT EXHAUST COLOR AND SOUND OF ENGINE IS NORMAL

CHECK THAT GAUGES WORK NORMALLY

CHECK THAT ABNORMALITIES FOUND ON PREVIOUS DAY HAVE BEEN REPAIRED

CHECK THAT PARKING BRAKE IS EFFECTIVE

CHECK THAT DOOR LOCK IS CORRECT

CHECK THAT WIPER, WINDOW WASHER WORKS CORRECTLY, CHECK THAT WASHER LIQUID LEVEL IS CORRECT

CHECK THAT STEERING MECHANISM WORKS CORRECTLY

Check the turning of steering wheel and the movement of the tires.

CHECK WIRE ROPE

Check the holder at the end of the rope, check the winding- on condition, and check for contact between ropes.

CHECK OUTRIGGER CHECK VALVE

Check that there is no hydraulic drift of the jack cylinder when the outriggers are extended.

CHECK OPERATION OF OSS ELECTRONIC PANEL

For details, see "12.36 SETTING OVERLOAD SAFETY SYSTEM".

CHECK OPERATION OF WORK EQUIPMENT

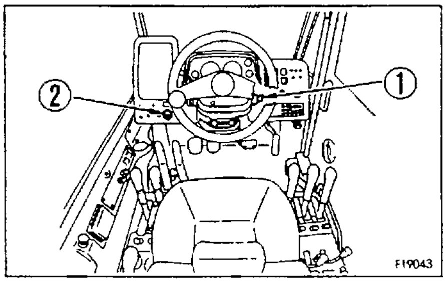
Check that the winding in and winding out of the winch, and the hoist, telescoping, and swing movement of the boom match the operation of the levers and pedals.

CHECK HOOKS

Check the movement of the bearings, check for deformation of the hooks, check that the stopper for the wire rope is normal.

CHECK THAT SWING BRAKE EFFECT IS CORRECT

CHECK OSS



1. Turn the key in starting switch ① to the START position and start the engine.
2. Set PTO switch ② to the "Operation 2" position.
3. Check that with Steps 1 and 2 the power of the OSS comes on, that all displays light up once within approx. 1 second, and that the buzzer sounds.
4. After carrying out the above operations, the outrigger mode will change to "ON-TIRE", so set it again.

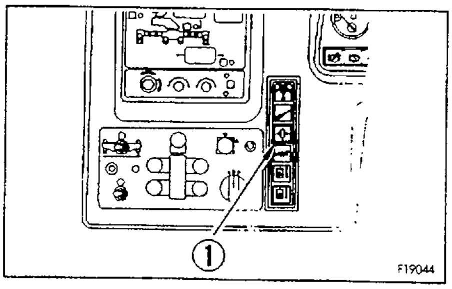
If the power has been turned on, or if the PTO switch has been operated, or if the outrigger has been operated, for safety reasons, the outrigger setting switch must be set again even when it is in the correct condition.

5. Raise the boom to a position above horizontal.
6. To check the automatic stop function, set the outrigger setting switch to the CHECK position.

7. Operate the control levers and check the following items.
   1) Check that the boom does not extend even when the boom telescope lever is operated.
   2) Check that the winch does not wind in even when the winch control lever is operated.
   3) Check that the boom does not go down even when the boom hoist lever is operated.
   4) Check that the alarm buzzer sounds and the warning lamp is lighted up.

8. Use the following procedure to check that the display values are normal.
   Check with the jib and single top stowed away.
   1) Check that the boom length display value is "9.5 ± 0.2 m (31.2 ± 0.7 ft)" when the boom length is at the minimum.
   2) Stow away the jib and single top, extend the outriggers fully, and set the machine horizontal.
   3) Set the working mode setting switch to BOOM.
   4) Set the outrigger setting switch to MAX EXTEND.
   5) Set the working mode setting switch to match the number of loops of rope on the chassis.
   6) Extend the boom fully, and check that the boom length display value is 30.5 ± 0.5 m (100.0 ± 1.6 ft).
   7) Lower the boom and set the angle display gauge to 30 ± 0.1°.
   8) Wind in the main hook to just before the overwind position, and check that after 1 minute the moment display is the display value for METHOD FOR CHECK BEFORE STARTING.

CHECK ACCUMULATOR PRESSURE



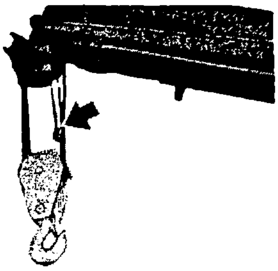
WARNING

If the accumulator pressure caution lamp lights up and the alarm buzzer sounds, stop operations immediately.

1. Check that accumulator pressure caution lamp ① is OFF.

2. If it is lighted up, start the engine and wait until the pressure goes above the specified pressure. When it reaches the set pressure, the lamp will go out and the buzzer will stop.

CHECK IF SAFETY DEVICES FUNCTION NORMALLY (OVERWIND SAFETYSYSTEM)



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CHECK THAT WINCH BRAKE WORKS PROPERLY

Raise the maximum load for the number of loops of rope, and check that it remains stopped when the clutch is disengaged.

CHECK THAT WINCH CLUTCH WORKS PROPERLY

Raise the maximum load for the number of loops of rope, and check that the load can be raised and lowered.

CHECK ELECTRIC WIRING

⚠ WARNING

If the fuse blows frequently, or if there is any sign of a short circuit in the electric wiring, always investigate and repair the cause.

Check for any damage to the fuse and for any sign of disconnections or short circuits in the electric wiring. Check also for loose terminals, and tighten if necessary.
Be particularly careful to check the following wiring.

- Battery
- Starting motor
- Alternator

When investigating and repairing the cause, please contact your Komatsu distributor.

CHECK JIB WINCH ROPE

Check the jib winch rope.

- Check for broken strands, wear, kinks, corrosion, or abnormality in the stopper at the end of the cable.

12.1.3 ADJUSTING BEFORE OPERATION

ADJUSTING OPERATOR'S SEAT

Ⓐ **Fore-and-aft adjustment of seat**

Move lever ① to the right, set the seat to the desired position, then release the lever.

Amount of fore-and-aft adjustment: 140 mm (5.5 in) (7 stages)

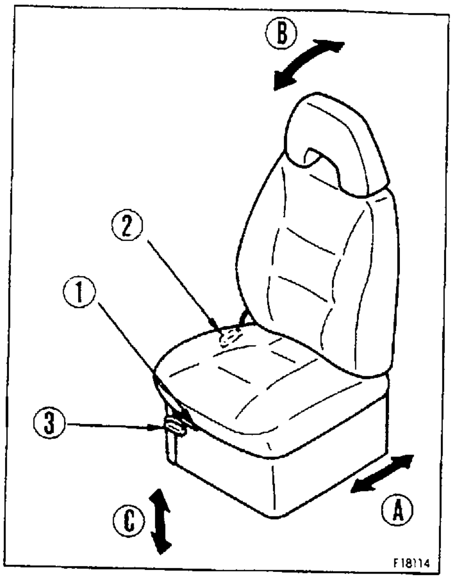
Ⓑ **Adjusting reclining angle**

Pull lever ②, set the seat back to the desired position, then release the lever.

Ⓒ **Adjusting seat height and tilt**

Pull lever ③ up or down to set the seat to the desired height. Push down to adjust the height at the front, and pull up to adjust the height at the back.

Amount of adjustment: 65 mm (2.6 in) (6 stages) (at front and rear)



SEAT BELT

⚠ WARNING

- **It is dangerous to fit or adjust the seat belt when traveling. Always put on the seat belt and adjust it before starting to travel.**
- **Always fit the lap belt so that it is across your hips. If you fit it across your stomach, there is danger of a powerful force being applied in the case of an accident.**

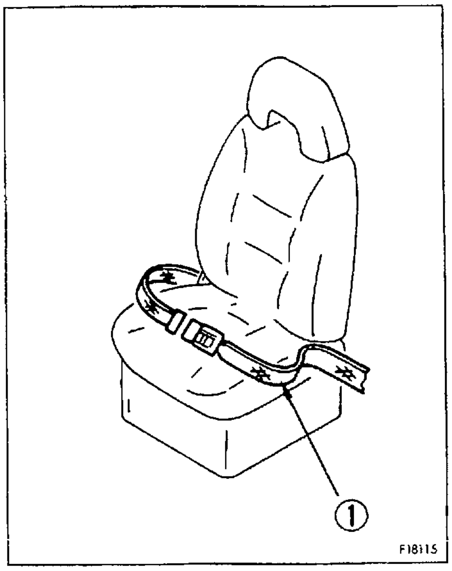
Method of fitting

1. Check that belt ① is not twisted, then insert the tongue into the buckle securely until there is a click.

2. Set the belt and plate straight, then pull the belt to adjust.

Method of removing

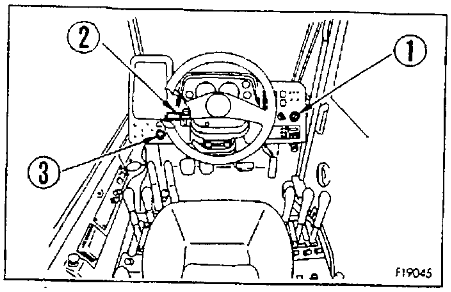
1. Press the red button on the buckle to release the belt.



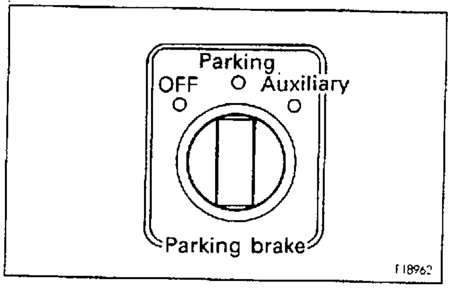
12.1.4 OPERATION, CHECK BEFORE STARTING ENGINE

⚠ WARNING

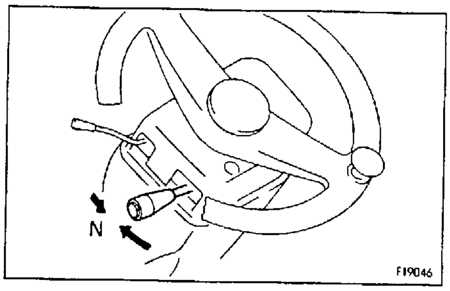
If the control levers are touched by accident, the machine may move suddenly.
When standing up from the operator's seat, tip the right control levers to the rear and place the lock pin of the winch clutch lever in the LOCK position.



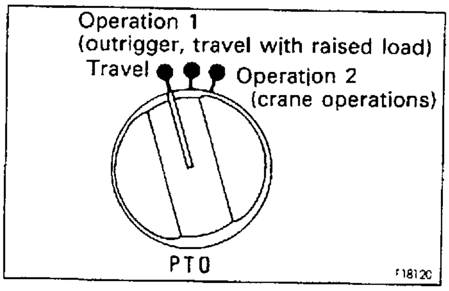
1. Check that parking brake switch ① is at the PARKING position.



2. Check that gear shift lever ② is at the N position.
   If the gear shift lever is not at the N position, the engine cannot be started.



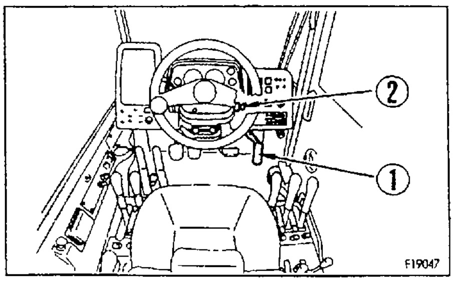
3. Check that PTO switch ③ is at the TRAVEL position.



4. Check that the work equipment control levers are all at the HOLD position.

12.2 STARTING ENGINE

12.2.1 NORMAL STARTING



⚠ WARNING

- **Check that there is no person or obstruction in the surrounding area, then sound the horn before starting the engine.**
- **If any starting aid fluid is used for starting, there is danger of an explosion, so never use such starting aids.**

NOTICE

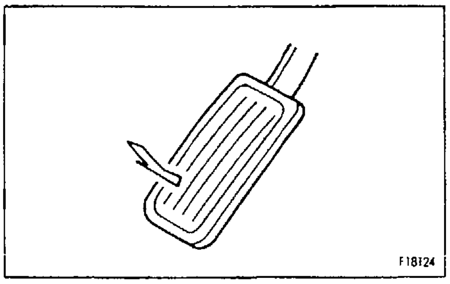
Do not crank the starting motor continuously for more than 20 seconds.

If the engine does not start, wait for about 2 minutes before trying to start again.

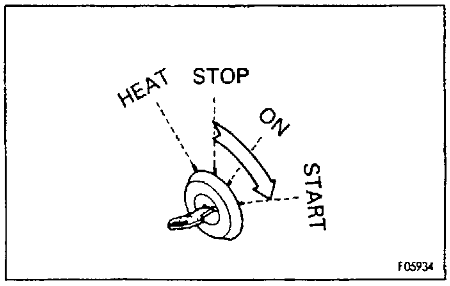
REMARK

If the gear shift lever is not at the N position, the engine will not start.

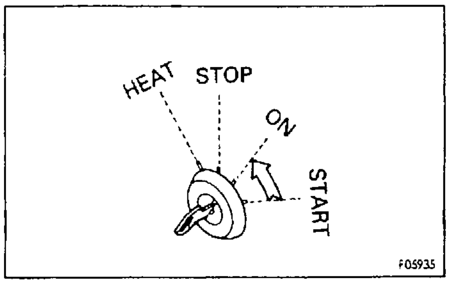
1. Depress accelerator pedal ① lightly.



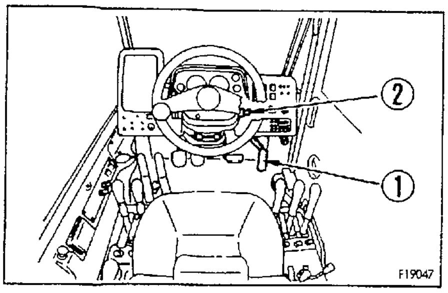
2. Insert the key in starting switch ②, turn to the START position and start the engine.



3. After starting, release the key in starting switch ②. The key will return automatically to the ON position.



12.2.2 STARTING IN COLD WEATHER



⚠ WARNING

- **Check that there is no person or obstruction in the surrounding area, then sound the horn before starting the engine.**
- **If any starting aid fluid is used for starting, there is danger of an explosion, so never use such starting aids.**

NOTICE

Do not crank the starting motor continuously for more than 20 seconds.

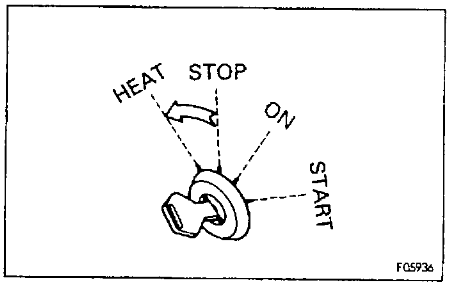
If the engine does not start, wait for about 2 minutes before trying to start again.

REMARK

If the gear shift lever is not at the N position, the engine will not start.

If the ambient temperature is low, do as follows.

1. Turn the key in starting switch ② to the HEAT position and carry out preheating in accordance with the table below.



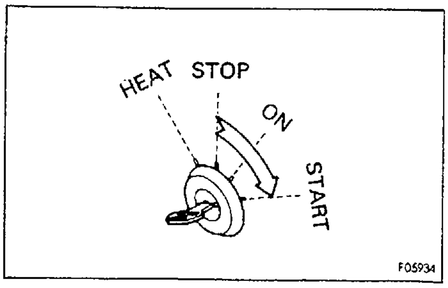
Ambient temperature	Preheating time
0°C and above	–
0°C to –10°C	20 sec.
–10°C to –20°C	30 sec.

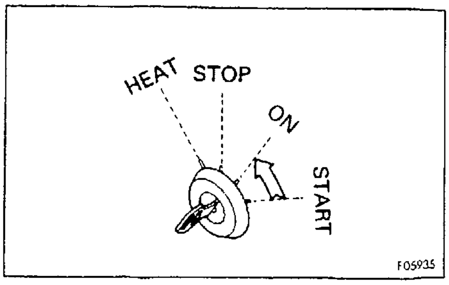
It will be difficult to start the engine if the preheating time is either too long or too short, so always keep to the preheating times in the table above.

2. Depress accelerator pedal ① lightly.

3. Insert the key in starting switch ②, turn to the START position and start the engine.

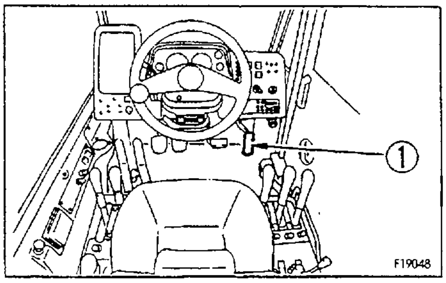
4. After starting, release the key in starting switch ②. The key will return automatically to the ON position.

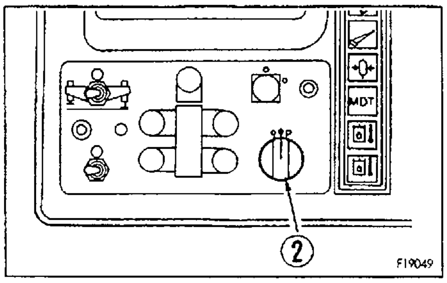




12.3 OPERATION, CHECK AFTER STARTING ENGINE

After starting the engine, do not start operations immediately. Carry out the following operations and checks first.

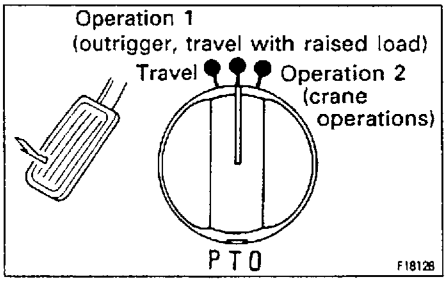




NOTICE

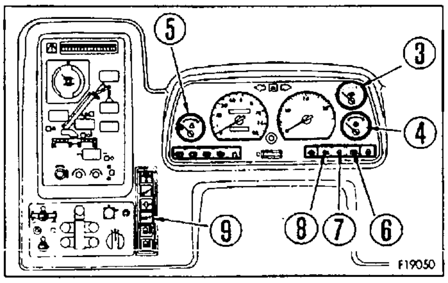
Do not accelerate the engine suddenly before completing the warming-up operation.
Do not run the engine at low idling or high idling continuosly for more than 20 minutes.
If it is necessary to continue to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.

1. Depress accelerator pedal ① lightly, run the engine at a mid-range speed, then run it for approx. 5 minutes at low idling. When starting in cold weather, set PTO switch ② to the "Operation 1" position when operating.



2. After the warming-up operation, check that the following items on the machine monitor are normal. If any abnormality is found, carry out maintenance or repair.

- Air pressure gauge ③: Is it in red mark – 10 kg/cm² range?
- Engine water temperature gauge ④: Is it in white range?
- Fuel gauge ⑤: Is it in white range?
- Battery charge caution lamp ⑥: Is it OFF?
- Engine oil pressure caution lamp ⑦: Is it OFF?
- Torque converter overheat caution lamp ⑧: Is it OFF?
- MDT check lamp ⑨: Is it OFF?



3. Check for any abnormal exhaust gas color, sound, or vibration. If any abnormality is found, repair it.

12.4 PREPARATIONS BEFORE MOVING MACHINE OFF (WHEN TRAVELING ON PUBLIC ROADS)

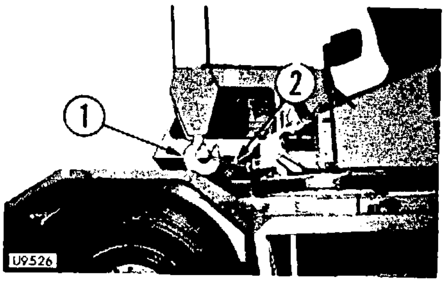
⚠ WARNING

- **Before operating the gear shift lever, check the direction that the upper structure is facing.**
- **Check that there is no one near the machine.**

12.4.1 TRAVEL POSTURE

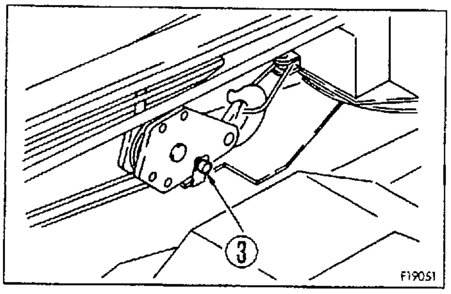
When traveling on roads, use the following procedure to set the machine to the travel posture.

1. Extend the outriggers, raise the boom, and move main hook ① to above the stowing position.
2. Insert hook ① in the stowing position, fit lock ring ②, then operate the main winch while lowering the boom to a horizontal position, and lay hook ① on top of the frame.

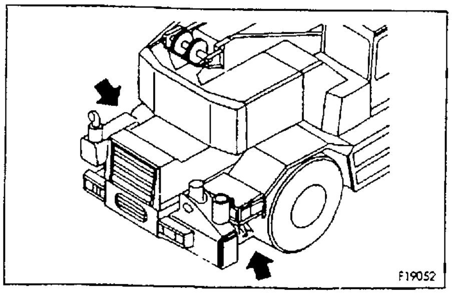


REMARK

When the boom is lowered to a position near horizontal, the overwind alarm buzzer will sound, so set the OSS automatic stop switch to the CANCEL position and continue the operation.

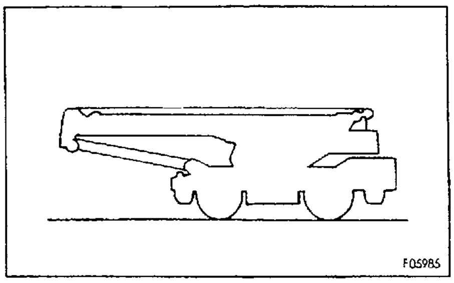


3. Insert lock pin ③, then insert the linch pin.
4. Wind in the wire rope to remove the slack, but be careful not to overwind.
5. Stow away the outriggers.
6. Set the PTO switch to the TRAVEL position.
   For details of the method of removing the main hook from the travel posture, see "12.27 PRECAUTIONS FOR OPERATION".
7. Check that the wooden blocks are securely stowed away.

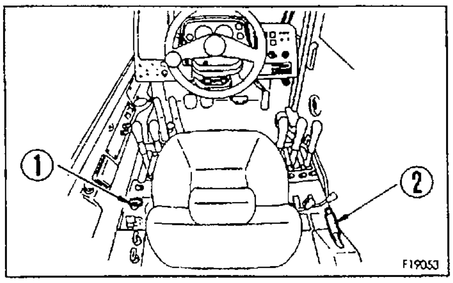


12.4.2 PREPARATIONS BEFORE TRAVELING

After setting the machine to the travel posture, carry out the following preparations before traveling on the road.

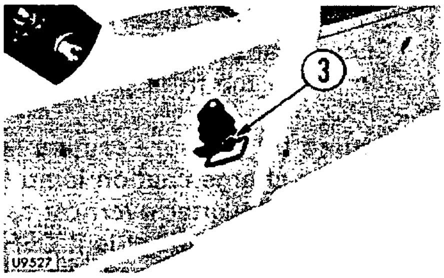


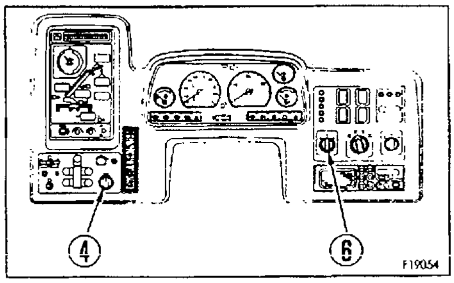
1. Set swing lock lever ① to the LOCK position, and pull swing brake lever ② fully to apply the brake.

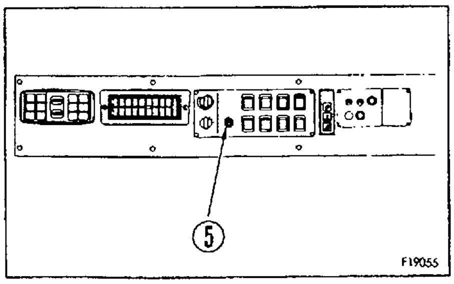


2. Operate each switch and lever to check that they are in the following condition or position.

- Does the pilot lamp indicate that the rear steering lock is at the LOCK position?
- Are the outriggers retracted fully and is stopper pin ③ inserted?
- Are all the control levers at the neutral position?
- Is PTO switch ④ at the TRAVEL position?
- Is travel mode switch ⑥ at the mode setting position?
- Is suspension switch ⑤ at the FREE position?
- Are the main and auxiliary winch levers locked?
- Are the main and auxiliary clutch levers at the ON position?
- Are the main and auxiliary drum lock levers at the LOCK position?
- Is the tire inflation pressure 784.5 kPa (8.0 kg/cm^2, 113.6 psi)?
- Are there any loose wheel nuts?
  When using a new machine, travel for 20 to 40 km, then stop and tighten all parts.



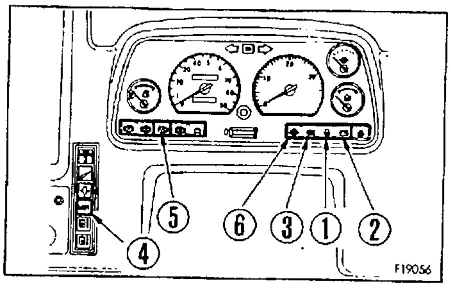




12.5 MOVING MACHINE OFF

⚠ WARNING

- **When moving the machine off, check that the area around the machine is safe, then sound the horn before starting.**
- **Do not allow people near the machine.**
- **There is a blind spot behind the machine, so be particularly careful when traveling in reverse.**
- **If the air tank pressure monitor is lighted up and the alarm buzzer sounds, the machine must not be started.**
  Raise the engine speed and wait for the buzzer to stop.

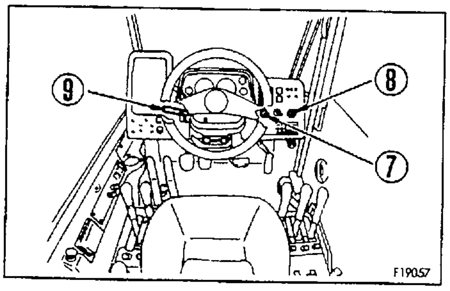


12.5.1 NORMAL STARTING

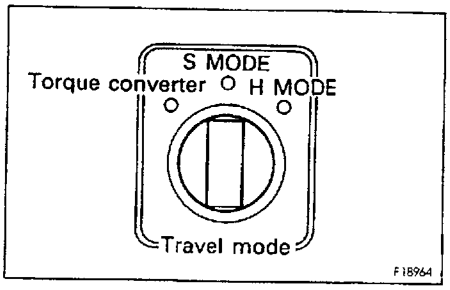
1. Check that there is no warning display on the following caution lamps on the front panel.

- Engine oil pressure caution lamp ①: Is it OFF?
- Battery charge caution lamp ②: Is it OFF?
- Torque converter overheat caution lamp ③: Is it OFF?
- MDT check lamp ④: Is it OFF?
- Brake oil level caution lamp ⑤: Is it OFF?
- Air pressure drop caution lamp ⑥: Is it OFF?

If any of the above caution lamps lights up, the alarm buzzer will sound.



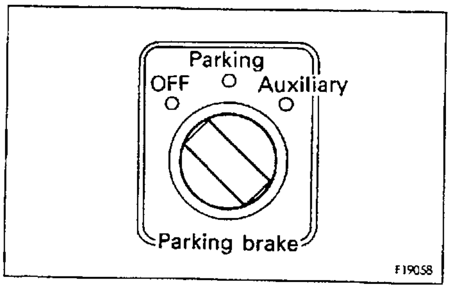
2. Set travel mode switch ⑦ to the S MODE position.



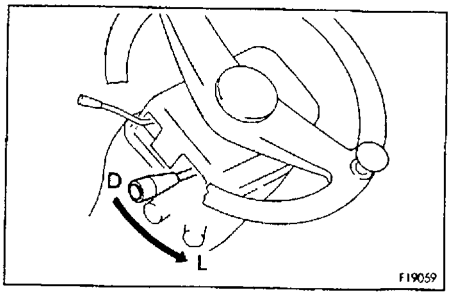
3. Turn parking brake switch ⑧ OFF, and check that the parking brake indicator lamp goes out.

REMARK

If the parking brake is not released and the gear shift lever is at any position other than N, the central warning lamp will flash and the alarm buzzer will sound.

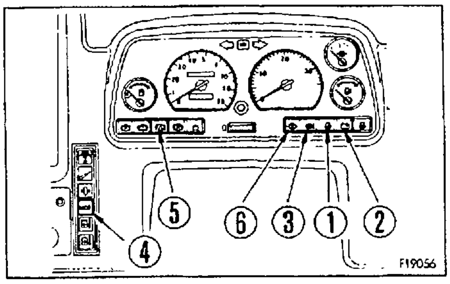


4. Operate gear shift lever ⑨, depress the accelerator pedal, and start the machine.



12.5.2 STARTING ON SLOPES

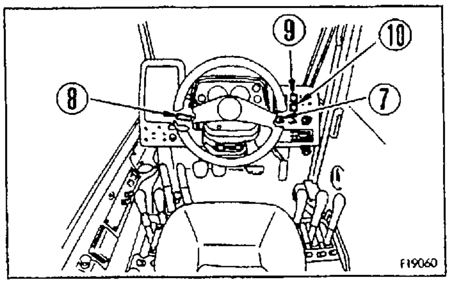
When starting on a slope, check the machine monitor, then do as follows.



1. Check that there is no warning display on the following caution lamps on the front panel.

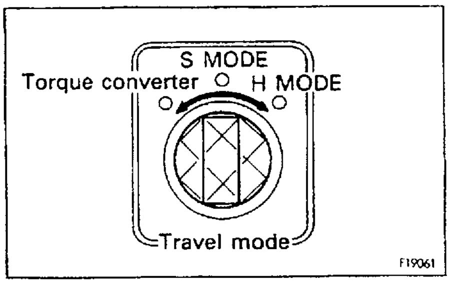
- Engine oil pressure caution lamp ①: Is it OFF?
- Battery charge caution lamp ②: Is it OFF?
- Torque converter overheat caution lamp ③: Is it OFF?
- MDT check lamp ④: Is it OFF?
- Brake oil level caution lamp ⑤: Is it OFF?
- Air pressure drop caution lamp ⑥: Is it OFF?

If any of the above caution lamps lights up, the alarm buzzer will sound.

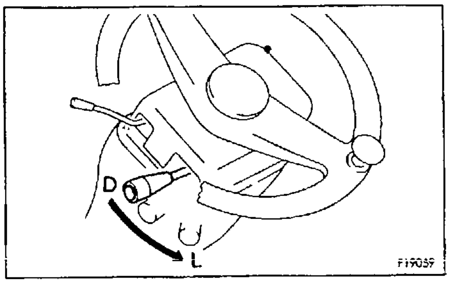


2. Set travel mode switch ⑦ to H MODE or TORQUE CONVERTER.

3. Depress the brake pedal, then release the parking brake.



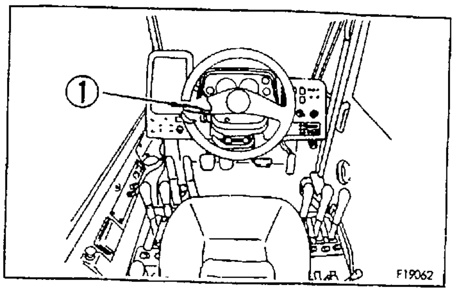
4. Set gear shift lever ⑧ to the D or L position, depress the accelerator pedal to raise the engine speed, and release the brake pedal slowly to allow the machine to start moving.



NOTICE

If it is impossible to start at the TORQUE CONVERTER position, depress the brake pedal, shift the gear shift lever to the N position, then set 4-wheel drive switch ⑨ and low speed switch ⑩ to 4-wheel drive and LO, then try to start the machine again.

12.6 SHIFTING GEAR



This machine has an automatic transmission, so if gear shift lever ① is at the D position, the gears will shift automatically to match the travel speed.

REMARK

If the travel mode switch is at the S MODE or H MODE position, and the gear shift lever is at the D or 2 position, the transmission will shift automatically to direct drive at above a certain speed to improve the efficiency of the drive.
Always stop the machine completely before shifting between forward and reverse.

SHIFTING DOWN

When shifting down, always shift down one stage at a time (D → 2, 2 → L). Do not shift down two stages at once.

REMARK

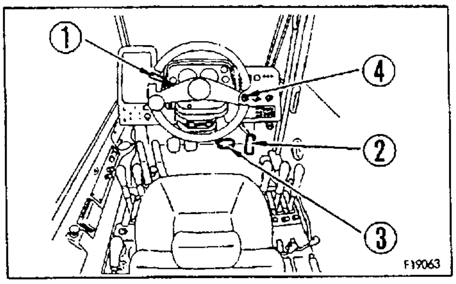
- Even if the gear is shifted down, the transmission will not shift down until the set speed is reached.
- When traveling downhill and shifting down to reduce speed, use the exhaust brake, foot brake, and braking force of the engine to reduce the engine speed to less than 1250 rpm before shifting gear.

Gear shift lever position and permissible travel speed

Gear shift lever position	Permissible travel speed	
	Hi	LOW (4-wheel drive, LO)
L	Max. 19 km/h	Max. 7 km/h
2	Max. 35 km/h	Max. 13 km/h
D	Max. 49 km/h	Max. 23 km/h
R	Max. 44 km/h	Max. 16 km/h

Do not travel at above the permissible speed for any gear shift lever position.
If the permissible speed is exceeded, the overrun warning buzzer inside the top panel will sound.

12.7 TRAVELING DOWNHILL



⚠ WARNING

If the foot brake is used frequently, there is danger that the brakes will overheat and cause damage to the brake system or other parts.

1. When traveling downhill, turn exhaust brake switch ① on, release accelerator pedal ②, and use the braking force of the engine. Keep the engine speed to within the permitted speed of 2750 rpm.

   When using the braking force of the engine, set travel mode switch ④ to the H MODE position.

2. If the travel speed still increases, reduce the speed with foot brake ③, then shift down (D → 2) to make the load on the foot brake as small as possible.

NOTICE

When shifting down, if the travel speed exceeds the permissible speed for any gear shift lever position, the overrun prevention function will be actuated and the gear will not shift down. If this happens, use the foot brake to reduce the travel speed.

REMARK

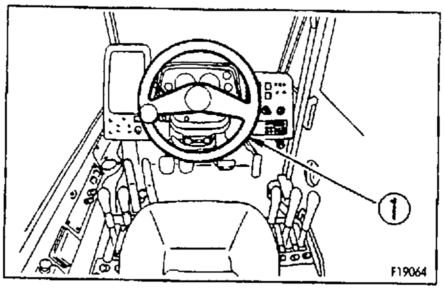
If accelerator pedal ② is depressed, the exhaust brake is canceled.

12.8 STEERING MACHINE

⚠ WARNING

- **Turning the machine on slopes may cause the machine to slip to the side, so avoid turning on slopes as far as possible. Be particularly careful on soft or clay ground.**
- **It is dangerous to travel down steep slopes or turn suddenly when traveling at high speed.**
- **If the engine stops when the machine is traveling, it will be impossible to operate the steering, so never stop the engine.**

12.8.1 NORMAL STEERING

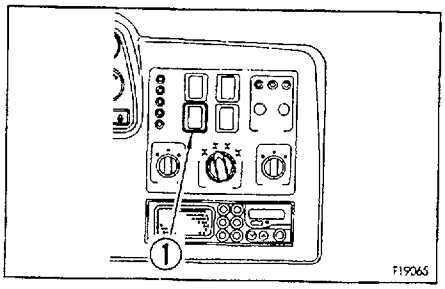


When traveling, turn steering wheel ① in the direction that the machine is to turn.

NOTICE

In cold weather, if the steering becomes heavy, turn the PTO switch to the "Operation 1" position and carry out the warming-up operation thoroughly.

12.8.2 EMERGENCY STEERING



⚠ WARNING

The emergency steering system must not be used continuously for more than 5 minutes. This system is only used in emergencies, so always check the system when carrying out periodic maintenance (EVERY 250 HOURS).

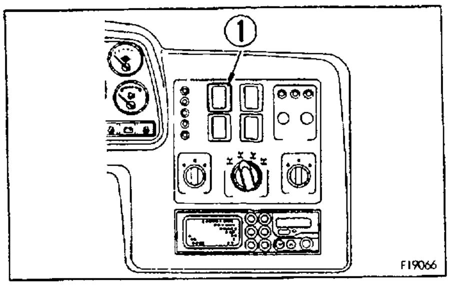
1. When emergency steering switch ① is pressed, the pilot lamp (red) inside switch will light up, and the steering can be operated.
2. After stopping the machine, press the switch again immediately and check that the pilot lamp has gone out.

NOTICE

Use this system only when the steering pump has broken down and the normal steering operation cannot be carried out.

Travel speed: Max. 5 km/h

12.8.3 REVERSE STEERING COMPENSATION MECHANISM



⚠ WARNING

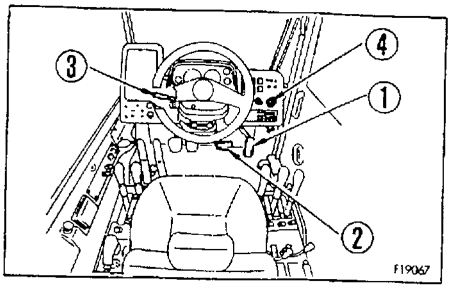
- **Do not travel on public roads with the upper structure turned to face the rear and the reverse steering compensation system engaged.**
- **When the upper structure is turned to face the front, always press the switch again to cancel the reverse steering compensation.**
- **Be careful when using the reverse steering compensation mechanism with front 2-wheel steering. In this condition, the steering will be carried out with the rear wheels, and not the with front wheels as normal.**

When the upper structure is turned to the rear, the reverse steering compensation is actuated. This means that the direction of operation of the steering wheel is not the opposite from the direction of steering. Press switch ① and check that the lamp (red) inside the switch lights up.

NOTICE

Never turn this switch ON when using crab steering.
Even when the reverse steering is being operated, the FORWARD/ REVERSE direction selection, and the operation of the backup buzzer and turn signal indicator lamps are not changed.

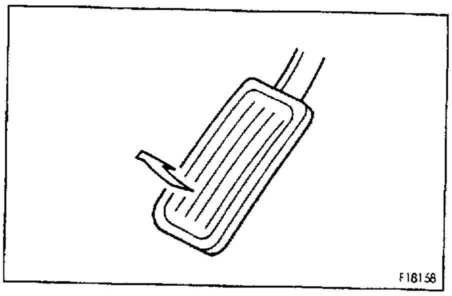
12.9 STOPPING MACHINE



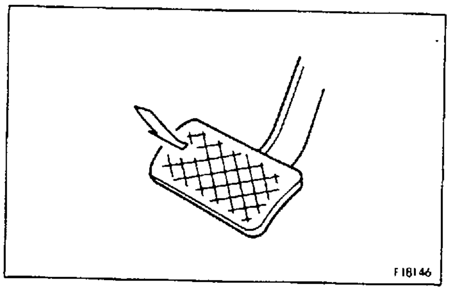
⚠ WARNING

- **Do not stop the machine suddenly except in emergencies. Use the braking force of the engine to slow down the machine before applying the foot brake, and leave room to spare when stopping.**
- **Do not park the machine on slopes. If the machine must be parked on a slope, block the wheels to prevent the machine from moving.**
- **If the control levers are touched by accident, the machine may move suddenly. When standing up from the operator's seat, tip the right control levers to the rear and place the lock pin of the winch clutch lever in the LOCK position.**

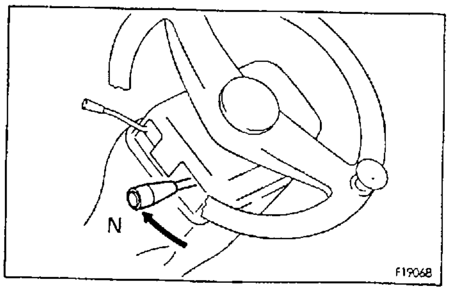
1. Release accelerator pedal ① and use the braking force of the engine to reduce the travel speed.



2. Depress brake pedal ② to apply the brake and stop the machine.



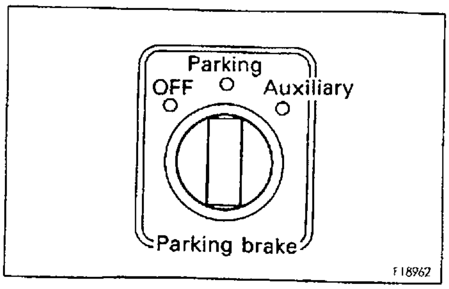
3. Move gear shift lever ③ to the N position.



4. Set parking brake switch ④ to the PARKING position.

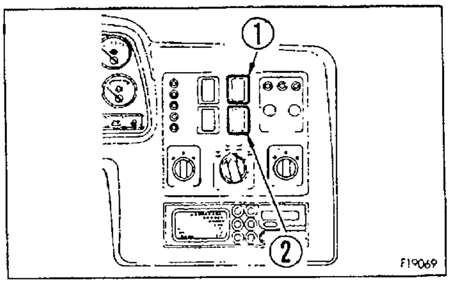
REMARK

Except in emergencies, the parking brake must be used only when the machine has completely stopped.



12.10 TRAVELING ON ROUGH GROUND

When traveling on slopes of more than 10%, or when traveling on rough or soft ground, first stop the machine and place 4- wheel drive switch ① and low switch ② to 4-wheel drive and LO, then drive the machine.



NOTICE

- **If the machine gets stuck on rough or soft ground, and the wheels start to spin, switch immediately to 4-wheel drive.**
  Do not allow the wheels to spin continuously for a long time.
- **Always stop the machine before switching between 2 wheel drive and 4-wheel drive.**

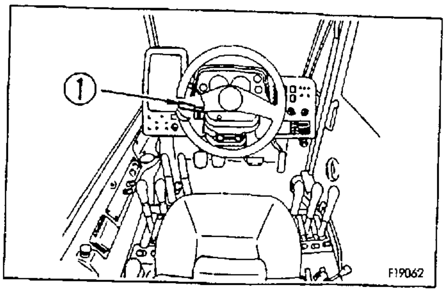
REMARK

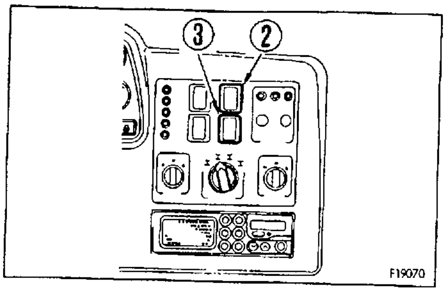
This machine cannot be driven on soft ground where the tires sink 10 cm (3.9 in) into the ground, so do not enter such areas.

12.11 SWITCHING 4-WHEEL DRIVE, HI-LOW (4-WHEEL DRIVE, LO)

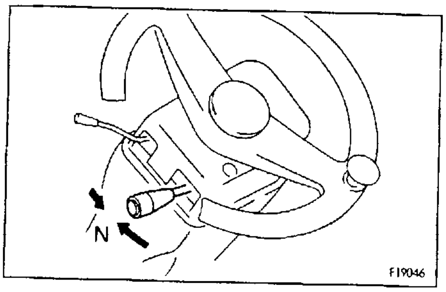
⚠ WARNING

To carry out the operation when switching to 4-wheel drive or between Hi and Lo smoothly and securely, do as follows.

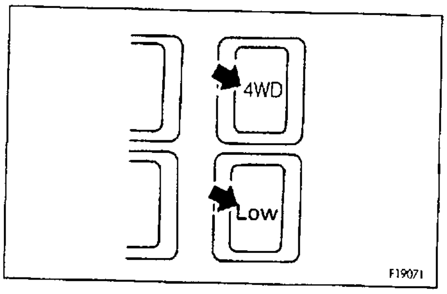




1. Stop the machine completely and set gear shift lever ① to the N position.



2. Set 4-wheel drive switch ② to 4WD, then press low switch ③ ON/OFF.



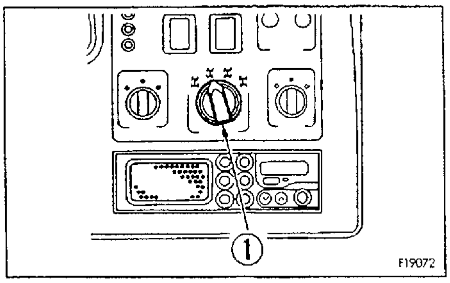
3. Set gear shift lever ① in position, then start the machine.

NOTICE

- **Never turn the low switch ON/OFF when traveling. However, it is possible to switch from 2 wheel drive (Hi) to 4-wheel drive Hi or from 4-wheel drive Hi to 2 wheel drive (Hi) by turning the 4-wheel drive switch ON/OFF.**
- **If it is attempted to switch to 4-wheel drive or between Hi and Lo when the gear shift lever is not at the N position or the machine is not stopped, the system will not be switched, and the alarm buzzer inside the top panel will sound.**

12.12 SPECIAL TRAVEL

12.12.1 STEERING MODES



⚠ WARNING

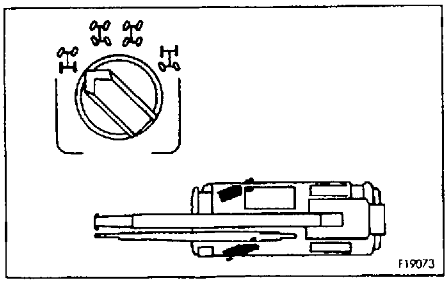
Always obey the following rules when using special steering.

- **Special travel must not be used when traveling on public roads.**
- **Never travel at high speed when using 4-wheel steering. Using 4-wheel steering when traveling at high speed is dangerous because it has the same effect as operating the steering wheel suddenly.**
  If the 4-wheel steering must be used when traveling, reduce the travel speed fully before operating the steering.
- **Always cancel the rear steering lock before using 4-wheel crab steering.**

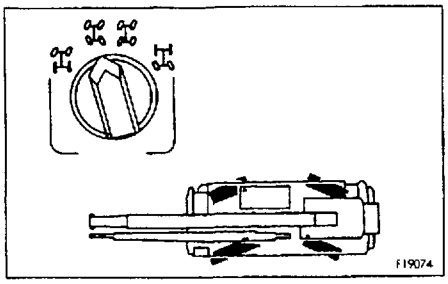
It is possible to select front 2-wheel steering, 4-wheel steering, crab steering, or rear 2-wheel steering by operating steering mode switch ①.

Check that the rear steering lock indicator CANCEL lamp (red) is lighted up.

- **SWITCH POSITION AND STEERING**

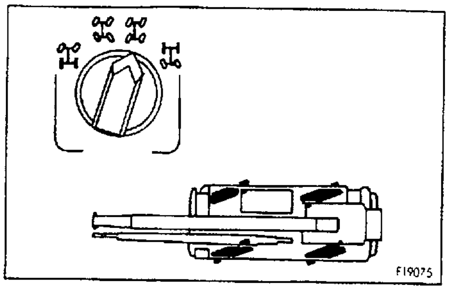


1) (front 2-wheel) position
   The rear steering lock is applied.
   Check that the LOCK lamp (orange) of the rear steering lock indicator lights up at the same time.



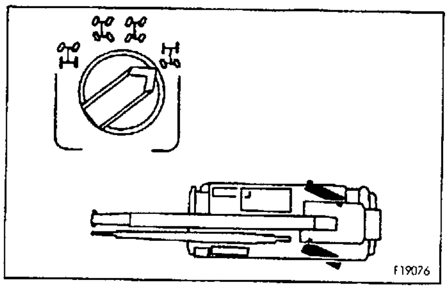
2) (4-wheel) position
   When the switch is set to this position, the rear wheels turn in the opposite direction from the front wheels.
   The rear steering lock is canceled.
   Check that the CANCEL lamp (red) of the rear steering lock indicator lights up at the same time.

3) (crab) position
When the switch is set to this position, the rear wheels turn in the same direction as the front wheels.
The rear steering lock is canceled.
Check that the CANCEL lamp (red) of the rear steering lock indicator lights up at the same time.



F19075

4) (rear 2-wheel) position
When the switch is set to this position, only the rear wheels turn.
The rear steering lock is canceled.
Check that the CANCEL lamp (red) of the rear steering lock indicator lights up at the same time.



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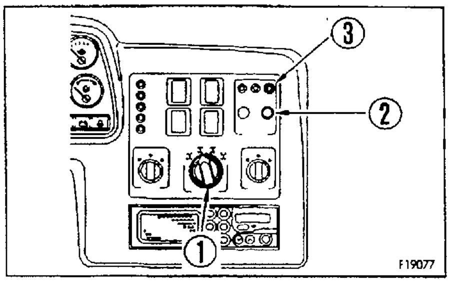
The relationship between the position of the switch, actuation of the rear steering lock, and movement of the rear wheels is as follows.

Switch position	Rear steering lock	Direction of rear wheels
Front 2-wheel	Lock is applied	–
4-wheel	Lock is canceled (made free)	Turn in opposite direction from front wheels
Crab	Lock is canceled (made free)	Turn in same direction as front wheels
Rear 2-wheel	Lock is canceled (made free)	Only rear wheels turn

12.12.2 METHOD OF APPLYING REAR STEERING LOCK



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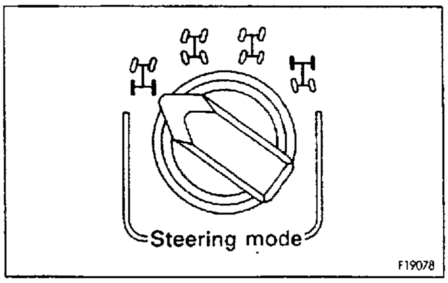
1. Set steering mode switch ① to the front 2-wheel position.



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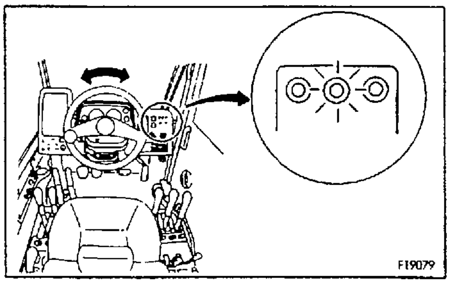
2. Keep rear steering lock switch ② pressed and turn the steering wheel slowly to the left and right. The CENTER (orange) lamp of rear steering lock indicator lamp ③ will light up and the rear steering lock will be applied. When it is locked, the LOCK lamp lights up.



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NOTICE

Do not turn the steering wheel suddenly.
When the LOCK lamp is lighted up, do not press the rear steering lock switch while operating the steering wheel.

12.12.3 METHOD OF CANCELING REAR STEERING LOCK

1. Set the steering mode switch to the front 2-wheel position.

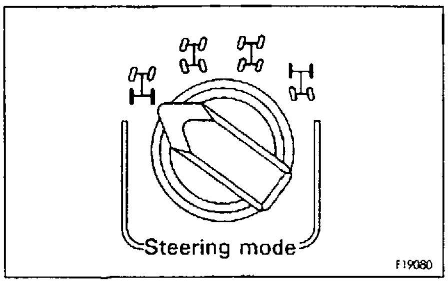
2. Press the rear steering lock cancel switch, and check that the CANCEL lamp (red) lights up.

3. If it does not light up, keep the rear steering lock cancel switch pressed and turn the steering wheel slowly to the left and right.

When the CANCEL lamp lights up, the cancel operation is completed.

NOTICE

Do not turn the steering wheel suddenly.



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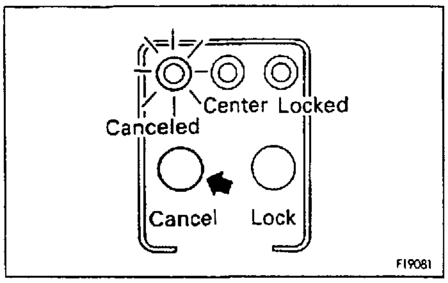

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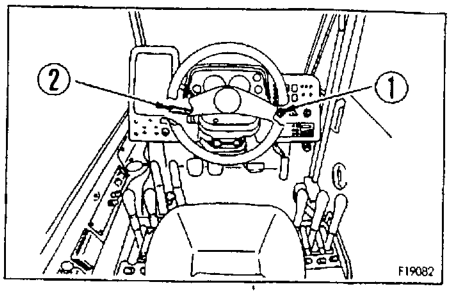
12.13 SWITCHING BETWEEN FORWARD AND REVERSE

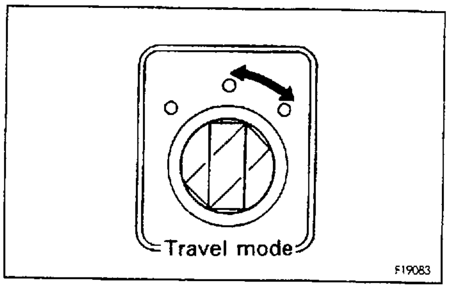


WARNING

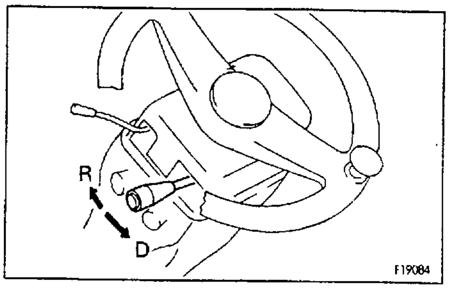
- **Stop the machine and check that the direction of travel is safe.**
- **There is a blind spot behind the machine, so be particularly careful when changing from forward to reverse.**

1. Stop the machine. For details, see "12.9 STOPPING MACHINE".

2. Set travel mode switch ① to the S MODE or H MODE position.



3. Set gear shift lever ② to the desired position (D or R).



12.14 PRECAUTIONS WHEN TRAVELING

12.14.1 PRECAUTIONS WHEN GOING UP OR DOWN HILLS

⚠ WARNING

- **Never place the gear shift lever at the N position when traveling downhill. It is dangerous to travel downhill without using the braking force of the engine. It will also lead to damage to the transmission and other parts of the power train.**
  Always place the gear shift lever in a travel position when traveling downhill.
- **When traveling downhill, use the exhaust brake and braking force of the engine to reduce the travel speed to a speed that matches the slope. On steep slopes where the travel speed increases, shift down to the 2 or L range to reduce the load on the foot brake as much as possible.**
  If the foot brake is used frequently, there is danger that the brakes will overheat and cause damage to the brake system or other parts.
- **If there is a burning smell from the brake pad or white smoke is given off, stop the machine immediately and rest the machine for some time.**
  While the machine is stopped, apply the parking brake and leave the foot brake free.
- **The braking force of the engine is reduced when 4-wheel drive is used, so do not use 4-wheel drive when traveling downhill.**

12.14.2 WHEN ENGINE STOPS

If the engine stops on a slope, immediately depress the foot brake pedal fully, stop the machine, and set the parking brake switch to the PARKING position. Then move the gear shift lever to the N position and start the engine again.

12.14.3 WHEN BRAKES DO NOT WORK

- There are two brake systems, so even if there is a failure in one of the brake lines, the brakes will still work. However, the braking capacity will be reduced. In such cases, travel at a low speed.

- If the brake should fail while the machine is traveling and it is necessary to make an emergency stop, use the parking brake to stop the machine.
  The parking brake must not be used for stopping the machine during normal travel operations.

12.14.4 PRECAUTIONS WHEN TRAVELING ON ROADS

⚠ **WARNING**

- **If the machine breaks down and it is necessary to park in a non-parking area, turn on the hazard switch to indicate that the machine has made an emergency stop.**
- **Never travel on roads with the working lamp or step lamp turned on.**

NOTICE

When traveling on public roads or when traveling at high speed, always set the steering mode switch to the front 2-wheel position and check that the rear steering lock is at the LOCK position before starting.
When switching from 4-wheel steering to 2 wheel steering, see "12.12 SPECIAL TRAVEL".

12.14.5 PRECAUTIONS WHEN TOWING

⚠ **WARNING**

The hook at the front of the machine is a simple hook, so use it for light loads, such as towing on flat ground.

If the machine must be towed on rough ground, use the towing hook at the back of the machine.

12.15 PRECAUTIONS BEFORE CRANE OPERATIONS

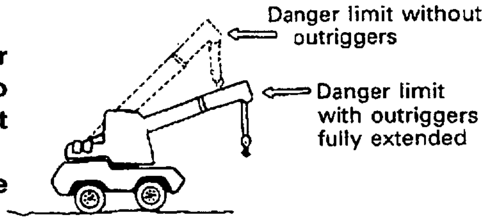
⚠ WARNING

Set the OSS correctly to match the crane operation.

- **The OSS calculates the moment in accordance with the switch setting.**
  If the setting is different from the actual operation, the following problems will appear, so be extremely careful when setting the switches.

Example:	**Actual work**	**Setting of switch**
Outriggers	**None**	**Max.**

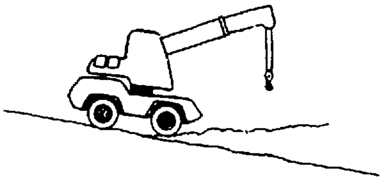
  If the above setting is used, the moment will be calculated for the condition when the outriggers are fully extended, so no warning or alarm will be given when the equipment approaches the danger zone.
  As a result, if the machine enters the danger zone, the machine may suddenly turn over without warning.


Danger limit without outriggers
Danger limit with outriggers fully extended

⚠ WARNING

Operate the machine only on horizontal ground.

- **The OSS calculates the moment assuming that the machine is horizontal.**
  If the machine is not horizontal and operations are carried out, no warning or alarm will be given even when the machine approaches the danger zone. In addition, an excessive moment will act on the machine and this will cause damage or breakage of the work equipment.



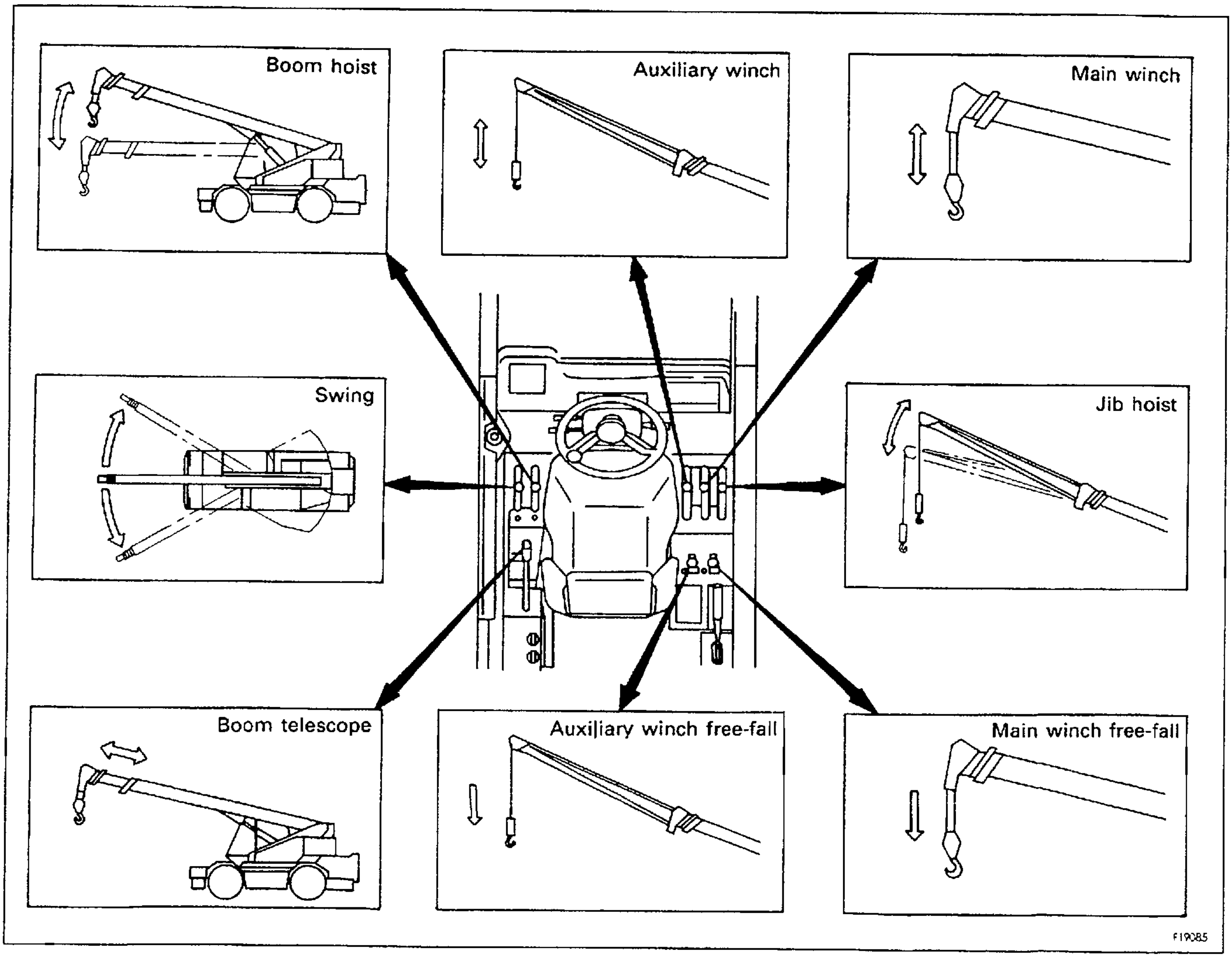
12.16 OUTLINE OF CRANE OPERATIONS

This section gives an explanation of crane operations.
The relationship between the control levers and the work equipment is shown in the diagram below. For details, see the explanation on the following pages.

Order

- Outrigger operations: 2-103
- Main winch operations: 2-115
- Auxiliary winch operations: 2-119
- Boom operations: 2-123
- Swing operations: 2-126
- Adjusting operating speed: 2-128
- Precautions for operation: 2-129

For details of the method of stowing the hook, see "12.4.1 TRAVEL POSTURE".



12.17 OUTRIGGER OPERATIONS

12.17.1 METHOD FOR OUTRIGGER OPERATIONS

⚠ WARNING

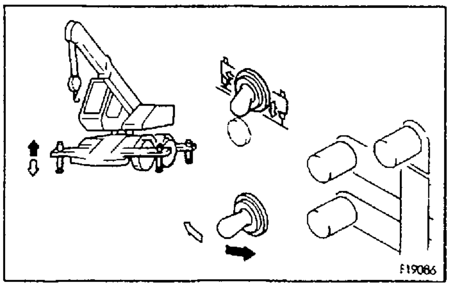
- **During crane operations there is danger of mistaken operation of the outriggers or the gear shift lever which may make the tires move. To prevent this, always set the PTO switch to the "Operation 2" position when carrying out crane operations.**
- **When carrying out operations on soft ground, uneven ground, or slopes, use blocks to match the conditions of the work site and make the machine horizontal.**
- **Use wooden blocks in flat areas such as asphalt or concrete road surfaces where there is danger that direct contact between the outrigger floats and the road surface may cause the damage to the road surface.**
  On soft ground or uneven ground, the blocks may break if the load is unbalanced.
- **When extending the outrigger slide, check first that there is no obstruction. If the outrigger pushes any obstacle, the slide cylinder may be damaged.**
- **When the outrigger floats are in contact with the ground, do not extend or retract the slide. This will damage the slide cylinder.**

NOTICE

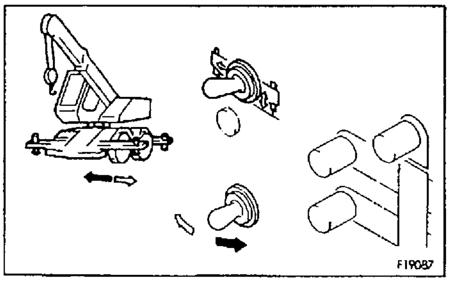
If the outrigger switch neutral lamp lights up when the outriggers are not being operated, set the outrigger switch immediately to the neutral position.
This lamp does not light up if you forget to return the switch on the lower outrigger control panel, so be sure to return the switch to neutral after finishing the outrigger operation.

The relationship between the outriggers and the outrigger setting switches is as follows.

- Outrigger jack operation

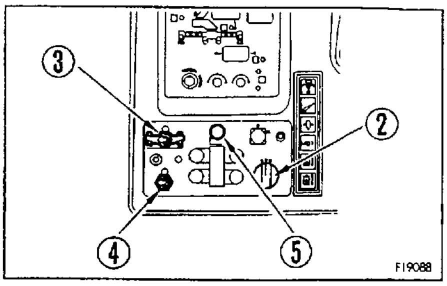


- Outrigger slide operation

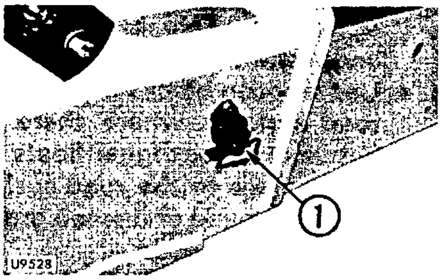


12.17.2 EXTENDING OUTRIGGERS

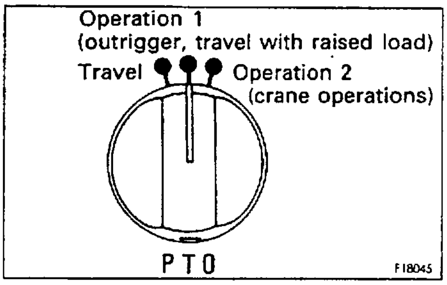
EXTENDING OUTRIGGERS FULLY



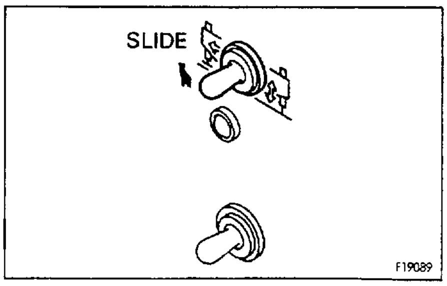
1. Remove the four outrigger slide stopper pins ①.



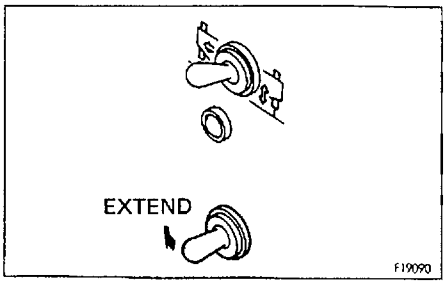
2. Run the engine at low idling, and turn PTO switch ② to the "Operation 1" position.



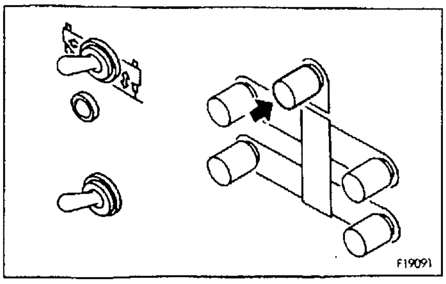
3. Set JACK/SLIDE operation switch ③ on the outrigger control panel to the SLIDE position.



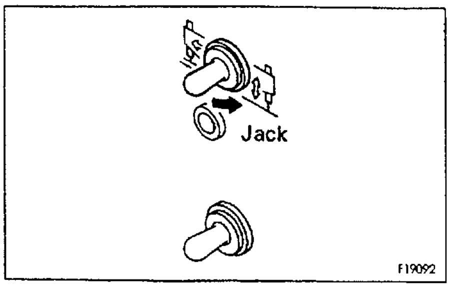
4. Set EXTEND/STOW switch ④ to the EXTEND position.



5. Press ALL switch ⑤ and extend the outriggers fully.

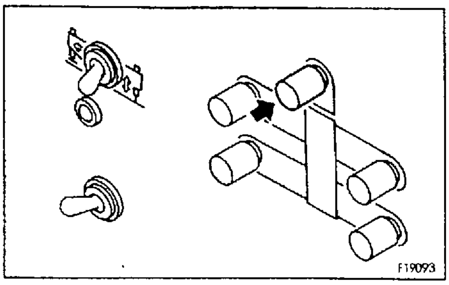


6. Set JACK/SLIDE operation switch ③ to the JACK position.

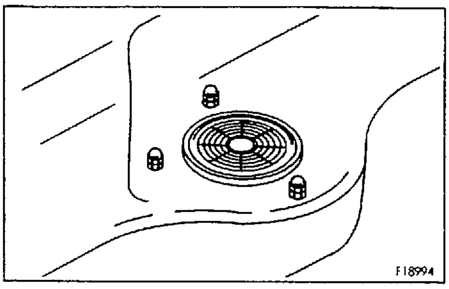


7. Press ALL switch ⑤ and extend the jacks fully.

REMARK
When the switch is released, it will automatically return to its original position.



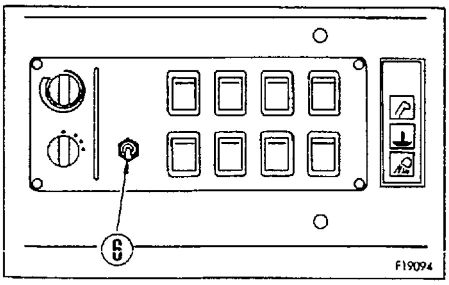
8. When the jack cylinders are fully extended, check the spirit level to confirm that the machine is in a horizontal position.
9. If it is not horizontal, operate the individual outriggers to make it horizontal.
10. After setting the outriggers in position, return the outrigger switch to the neutral position.



11. Set suspension switch ⑥ to the LIFT position to retract the suspension cylinder.

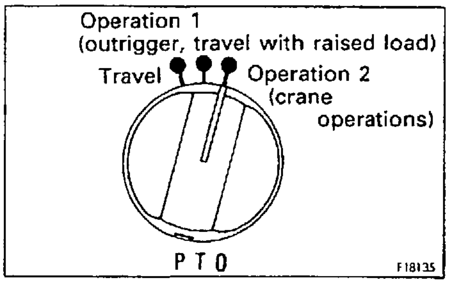
REMARK
If the PTO switch is set to the "Operation 1" or "Operation 2" positions, the suspension is automatically locked. However, the lift is not operated, so always carry out the lift operation.

12. After checking that the suspension cylinder has been retracted, turn the suspension switch to the LOCK position.

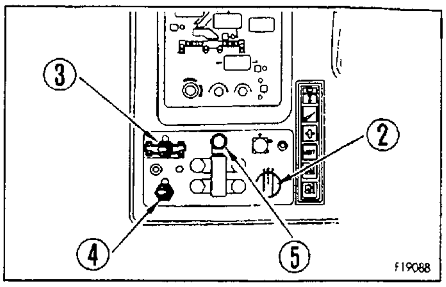


REMARK
When the switch is released, it is set to the LOCK position.

13. Set the PTO switch to the "Operation 2" position.



PARTIAL EXTENSION, MINIMUM EXTENSION



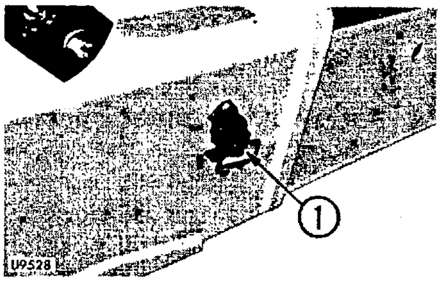
⚠ WARNING

The outriggers can be partially extended to 5.0 m (16.4 ft) and 3.7 m (12.1 ft). When extending the outriggers to any other position, see "12.36 SETTING OVERLOAD SAFETY SYSTEM (OSS)".

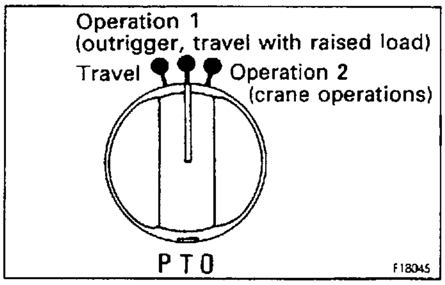
⚠ WARNING

The minimum extension position for the outriggers can be set only for machines with H-shaped outriggers. The minimum extension for machines with X-shaped outriggers is 3.7 m (12.1 ft).

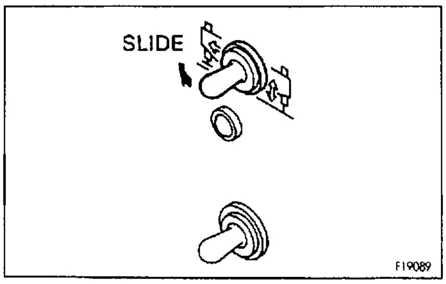
1. Remove the four outrigger slide stopper pins ①.



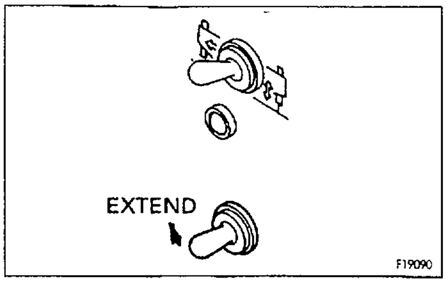
2. Run the engine at low idling, and turn PTO switch ② to the "Operation 1" position.



3. Set JACK/SLIDE operation switch ③ on the outrigger control panel to the SLIDE position.



4. Set EXTEND/STOW switch ④ to the EXTEND position.

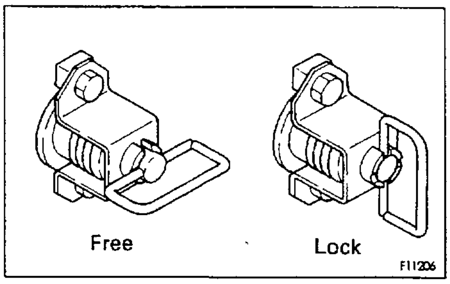


5. Press ALL switch ⑤ and extend the outriggers to the desired position.

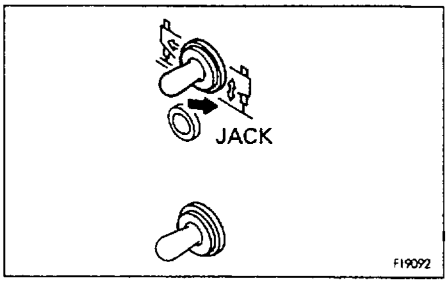
6. Turn the slide stopper pin to the inner box LOCK position, then operate the switch again, and when the slide stopper pin enters the lock hole in the inner box, stop the operation of the switch.

REMARK

The slide stopper pin is inserted by the force of a spring.
If it does not enter the inner box easily, operate the outriggers individually.
Check that all four pins have entered the holes securely.



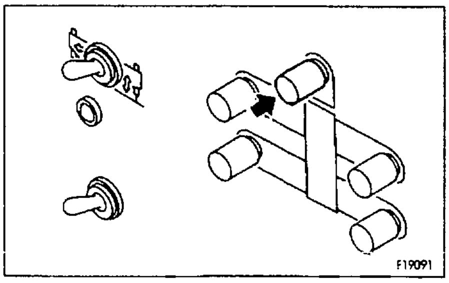
7. Set JACK/SLIDE operation switch ③ to the JACK position.



8. Press ALL switch ⑤ and extend the jacks fully.

REMARK

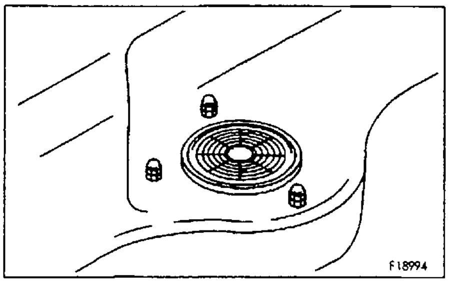
When the switch is released, it will automatically return to its original position.



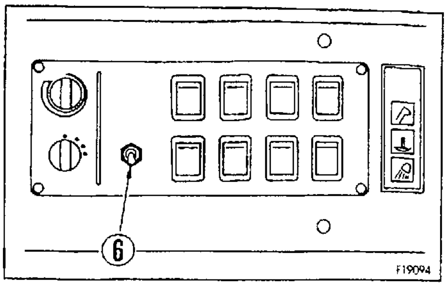
9. When the jack cylinders are fully extended, check the spirit level to confirm that the machine is in a horizontal position.

10. If it is not horizontal, operate the individual outriggers to make it horizontal.

11. After setting the outriggers in position, return the outrigger switch to the neutral position.



12. Set suspension switch ⑥ to the LIFT position to retract the suspension cylinder.



REMARK

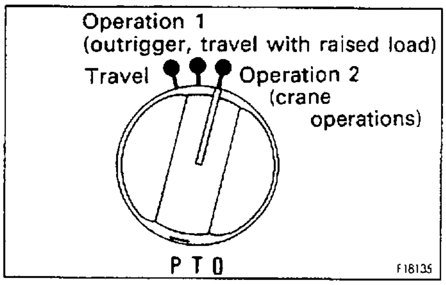
If the PTO switch is set to the "Operation 1" or "Operation 2" positions, the suspension is automatically locked. However, the lift is not operated, so always carry out the lift operation.

13. After checking that the suspension cylinder has been retracted, turn the suspension switch to the LOCK position.

REMARK

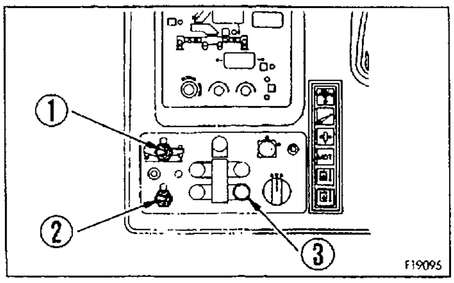
When the switch is released, it is set to the LOCK position.

14. Set the PTO switch to the "Operation 2" position.

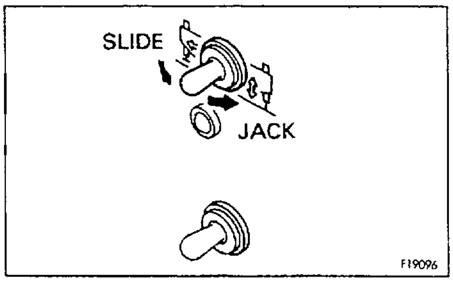


12.17.3 INDIVIDUAL OPERATION

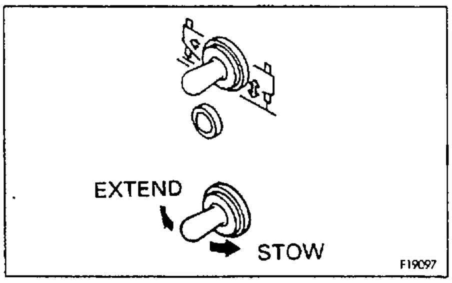
When operating the outriggers individually, do as follows.



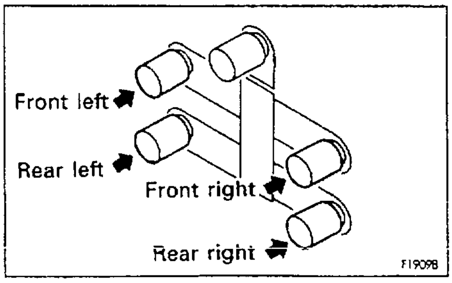
1. Set JACK/SLIDE switch ① to the JACK or SLIDE position.



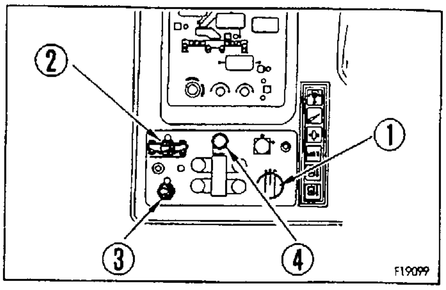
2. Set EXTEND/STOW switch ② to the EXTEND or STOW position.



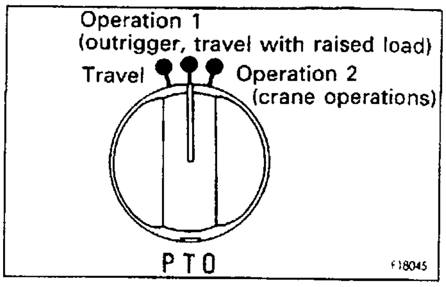
3. Press switch ③ for the outrigger that is to be operated.
   These switches can be used to operate the jack or slide individually for the outrigger.



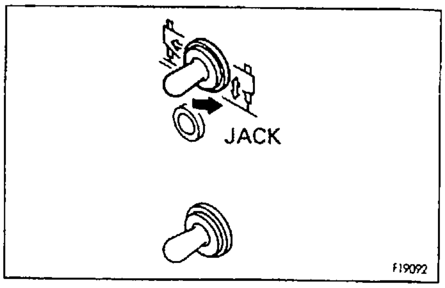
12.17.4 STOWING



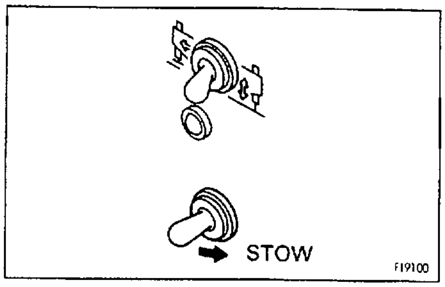
1. Set PTO switch ① to the "Operation 1" position.



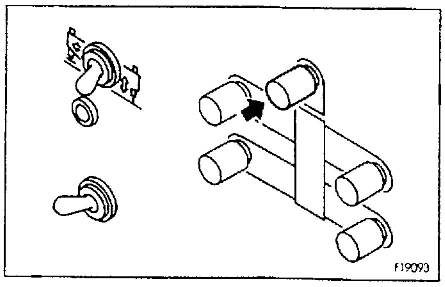
2. Set JACK/SLIDE operation switch ② to the JACK position.



3. Set EXTEND/STOW switch ③ to the STOW position.

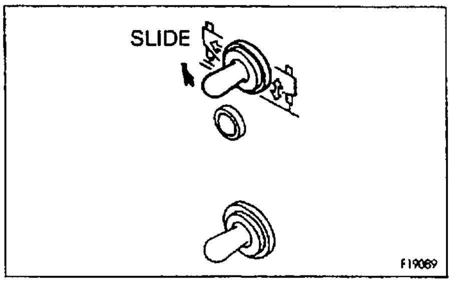


4. Press ALL switch ④ to stow the jacks.

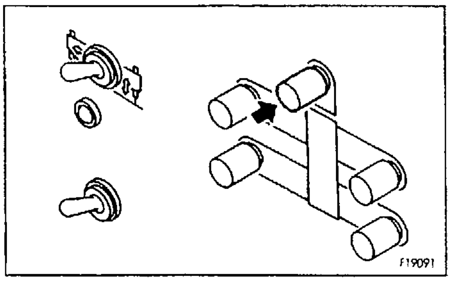


5. Remove the four slide stopper pins. (Partial extension only)

6. Set JACK/SLIDE operation switch ② to the SLIDE position.



7. Press ALL switch ④ to stow the outriggers.



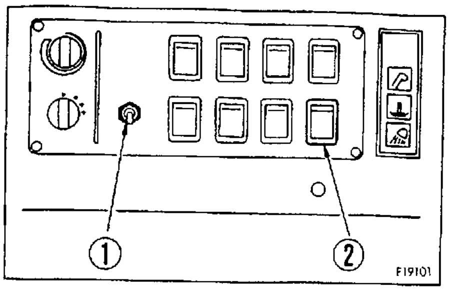
8. Set the four slide stopper pins in the lock holes.

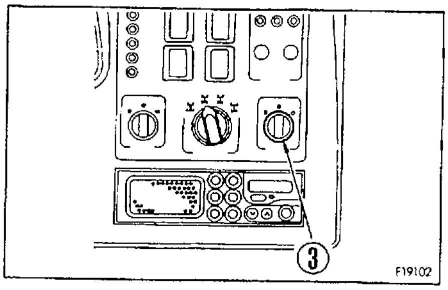
9. After completing the operation, return the outrigger switch to the neutral position.

12.18 WHEN OUTRIGGERS ARE NOT USED (ON-TIRE OPERATIONS)

When operations are carried out without using the outriggers, carry out the following preparations and precautions.

12.18.1 STATIONARY OPERATION





⚠ WARNING

- **When carrying out operations without using the outriggers, pay careful attention to the following points.**
  - ○ **The jib cannot be used.**
  - ○ **Free-fall operations cannot be carried out.**
  - ○ **The rated overall load is different depending on the direction of operation of the boom.**
  - ○ **The rated overall load when not using the outriggers is for operations on firm horizontal ground.**
  - ○ **Be careful when swinging from the front to the side, as the deflection of the tires will make the boom angle smaller and the working radius larger.**
  - ○ **The rated overall load is different for over-front operations and 360° operations, so when swinging from the front to the side, be careful not to cause overload. Even if the alarm buzzer sounds, the swing operation is not stopped automatically, so stop the swing operation immediately. When lifting a load off the ground at the front and swinging to the side, make sure to set the load shown in the rated overload load table for 360° operations when lifting the load off the ground at the front.**
- **During crane operations there is danger of mistaken operation of the gear shift lever which may make the tires move. To prevent this, always set the PTO switch to the "Operation 2" position when carrying out crane operations.**

1. Set suspension switch ① to the LIFT position to retract the suspension cylinder.

2. After checking that the suspension cylinder has been retracted, turn the suspension switch to the LOCK position.

REMARK

When the switch is released, it is set to the LOCK position. For safety reasons, if the PTO switch is set to the "Operation 1" or "Operation 2" positions, the suspension is automatically locked. However, the lift is not operated, so always carry out the lift operation.

3. Check that the tire inflation pressure is 784.5 kPa (8.0 kg/cm^2, 113.6 psi).

4. Set the front and rear wheels parallel to the chassis.

5. Set swing free switch ② to the LOCK position.

6. Set parking brake switch ③ to the AUXILIARY BRAKE position.

7. Set the PTO switch to the "Operation 2" position, then carry out the crane operation.

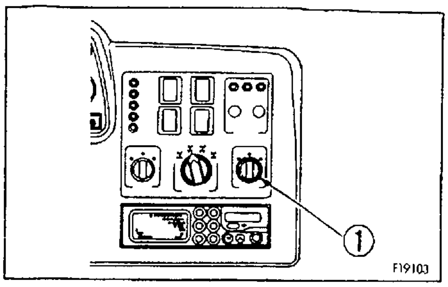
12.18.2 TRAVELING WITH RAISED LOAD

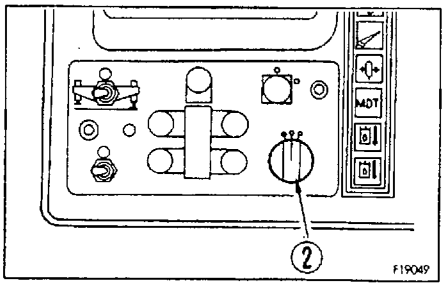
⚠ WARNING

When traveling with a raised load, keep to the following precautions.

- **When traveling with a raised load, do not operate the crane.**
- **Check the condition of the ground, the surrounding area, and the operating conditions before starting to travel.**
- **Set the 4-wheel drive switch and low switch to 4WD LO, or set the travel mode selector switch to TORQUE CONVERTER and the gear shift lever to L, 2, or R when traveling.**
- **Do not shift gear when traveling.**
- **Before starting to travel,**
  - ○ **Apply the swing brake or apply the swing lock lever.**
  - ○ **Turn parking brake switch ① to the OFF position.**
  - ○ **Set the swing free switch to the LOCK position.**
- **Travel at a maximum speed of 1.6 km/h, hold the load close to the ground surface to prevent it from swaying, and be particularly careful when cornering, or starting or stopping suddenly.**
- **When stopping the machine, do the following before starting the crane operation.**
  - ○ **Release the swing brake or swing lock.**
  - ○ **Set parking brake switch ① to the AUXILIARY BRAKE position.**

Set PTO switch ② to the "Operation 1" position. The machine cannot travel in the "Operation 2" position.



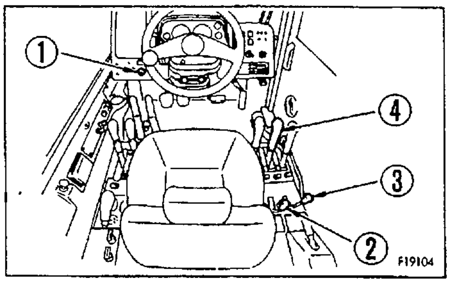


12.19 MAIN WINCH OPERATIONS

12.19.1 CHECKS, PREPARATION BEFORE OPERATION

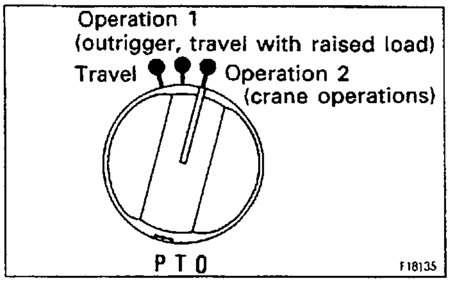
⚠ WARNING

- **Check that both the main winch and auxiliary winch clutch levers are at the ON position, and that the auxiliary winch lever is locked before starting operations.**
- **Do not move the clutch levers to the OFF position when the engine is stopped unless the hook has been lowered to the ground.**

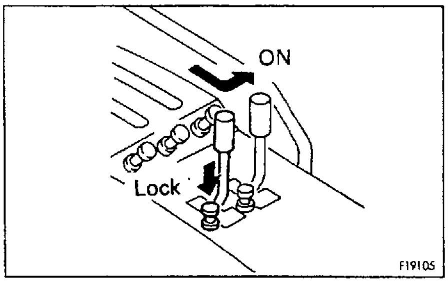


Before starting operations, carry out the following preparations

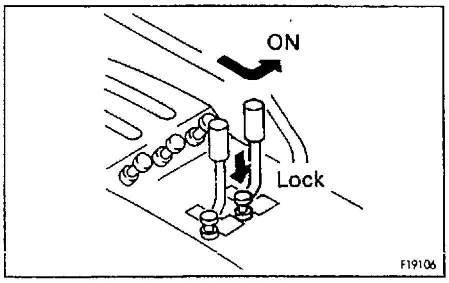
1. Set PTO switch ① to the "Operation 2" position.



2. Set auxiliary winch clutch lever ② to the ON position and set the lock pin to the LOCK position.



3. Set main winch clutch lever ③ to the ON position and set the lock pin to the LOCK position.



REMARK

Remove the lock only when carrying out free-fall operations.

4. Release the lock of winch lever ④.
5. Check that the auxiliary winch lever is locked.

12.19.2 WINDING-IN, WINDING-OUT OPERATIONS

⚠ WARNING

- **Be careful when raising a load. The boom will bend, so the load will move slightly to the front.**
- **When a load has been raised, never operate the main winch clutch lever.**
- **When holding a load in mid-air, always keep the main winch brake pedal depressed.**
  In addition, to keep the load stopped securely, set the main winch drum lock knob to the LOCK position.
- **If the main winch clutch lever has to be operated when a load is being held in mid-air, always keep the main winch brake pedal depressed while operating.**

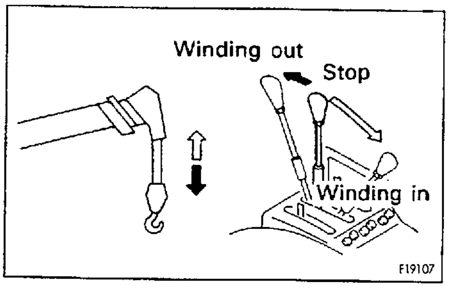
NOTICE

If either the hoist or telescope lever is operated fully, the winding-in operation cannot be carried out at high speed.

Operate the main winch control lever as follows.

- Winding in: Pull the lever back
- Stop: Place the lever at neutral
- Winding out: Push the lever forward gradually

Adjust the speed when winding in and winding out by adjusting the movement of the main winch lever and the accelerator pedal.



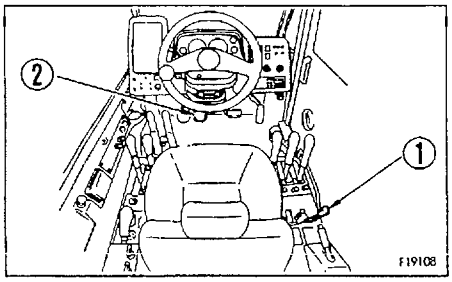
REMARK

When winding in with the swing switch at the LOCK position, it is possible to press the switch on the winch lever knob (swing free switch) to free the swing and prevent the load from swaying to the side.
When the load leaves the ground, release the switch.

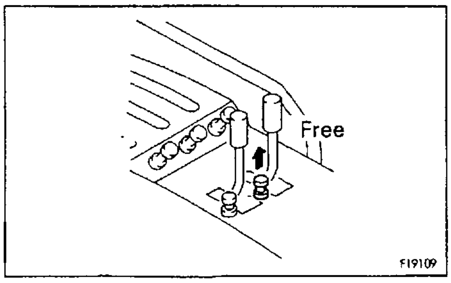
12.19.3 FREE-FALL OPERATION

⚠ WARNING

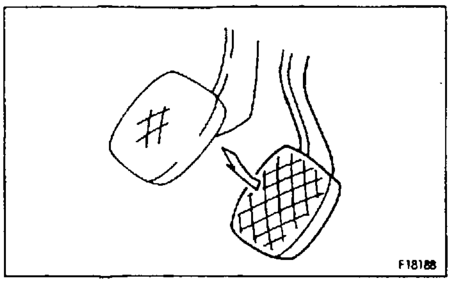
- **When carrying out free-fall operations, never remove your foot from main winch brake pedal ②.**
- **When carrying out free-fall operations, be careful of the following.**
  - **As a basic rule, the free-fall operation is used only when lowering the hook without a load, but if the free- fall operation is used when there is a load, the load must be less than 1/5 of the rated overall load, and the weight for each length of wire rope must be less than 600 kg (1323 lb).**
  - **Do not operate the lever or pedal suddenly.**
  - **Set the machine on firm horizontal ground with the outriggers fully extended.**
- **When operating the main winch clutch lever from the OFF position to the ON position, always move the lever to the bottom position and check that it is ON, then slowly release the main winch brake pedal. When releasing the pedal, apply the lock to the main winch clutch lever.**
- **Never carry out free-fall operations when the wire rope is pulled out to near the end of its maximum length or when carrying out work below ground level.**
  There is danger that the wire rope may break or be wound back on to the drum in reverse.

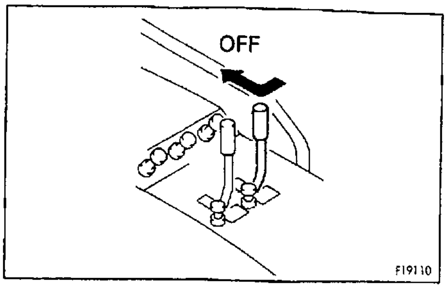


1. Set the lock pin of main winch clutch lever ① to the FREE position.



2. Depress main winch brake pedal ②.





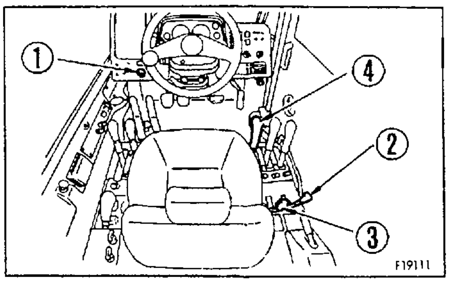
3. Push main winch clutch lever ① to the OFF position. Keep main winch brake pedal ② depressed when doing this.
4. Adjust the amount that main winch brake pedal ② is depressed to control the down speed.
5. When the load comes near to the position where it is to be stopped, gradually depress main winch brake pedal ②.

REMARK

For reference, there is a yellow mark on the main wire rope over a range of approx. 60 m (197 ft) from the drum mount.

12.20 AUXILIARY WINCH OPERATIONS

12.20.1 CHECKS, PREPARATION BEFORE OPERATION

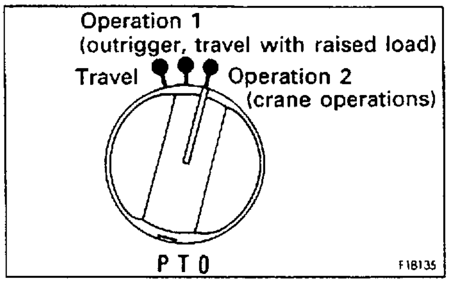


⚠ WARNING

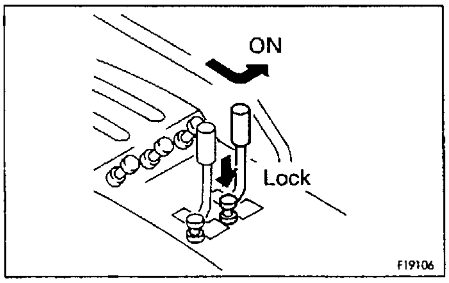
- **Check that both the main winch and auxiliary winch clutch levers are at the ON position, and that the main winch lever is locked before starting operations.**
- **Do not move the clutch levers to the OFF position when the engine is stopped unless the hook has been lowered to the ground.**

Before starting operations, carry out the following preparations.

1. Set PTO switch ① to the "Operation 2" position.

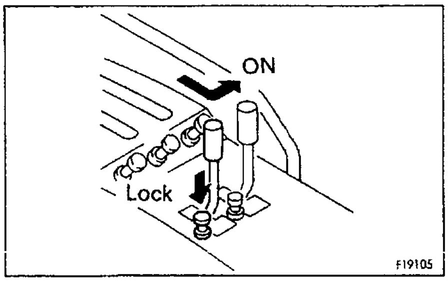


2. Set main winch clutch lever ② to the ON position and set the lock pin to the LOCK position.



3. Set auxiliary winch clutch lever ③ to the ON position and set the lock pin to the LOCK position.

REMARK
Remove the lock only when carrying out free-fall operations.



4. Release the lock of auxiliary winch lever ④.
5. Check that the main winch lever is locked.

12.20.2 WINDING-IN, WINDING-OUT OPERATIONS

⚠ WARNING

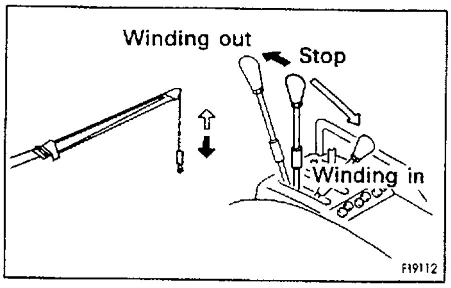
- **Be careful when raising a load.The boom will bend, so the load will move slightly to the front.**
- **When a load has been raised, never operate the auxiliary winch clutch lever.**
- **When holding a load in mid-air, always keep the auxiliary winch brake pedal depressed.**
  In addition, to keep the load stopped securely, set the auxiliary winch drum lock knob to the LOCK position.
- **If the auxiliary winch clutch lever has to be operated when a load is being held in mid-air, always keep the auxiliary winch brake pedal depressed while operating.**

NOTICE

If either the hoist or telescope lever is operated fully, the winding-in operation cannot be carried out at high speed.

Operate the auxiliary winch control lever as follows.

- Winding in: Pull the lever back
- Stop: Place the lever at neutral
- Winding out: Push the lever forward gradually



Adjust the speed when winding in and winding out by adjusting the movement of the auxiliary winch lever and the accelerator pedal.

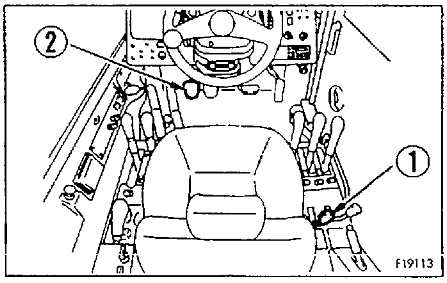
REMARK

When winding in with the swing switch at the LOCK position, it is possible to press the switch on the winch lever knob (swing free switch) to free the swing and prevent the load from swaying to the side.
When the load leaves the ground, release the switch.

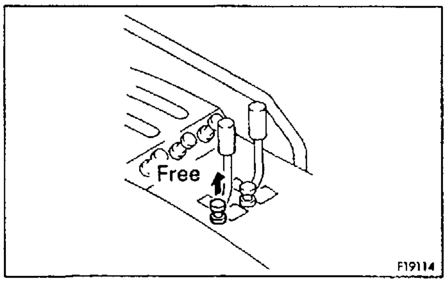
12.20.3 FREE-FALL OPERATION

WARNING

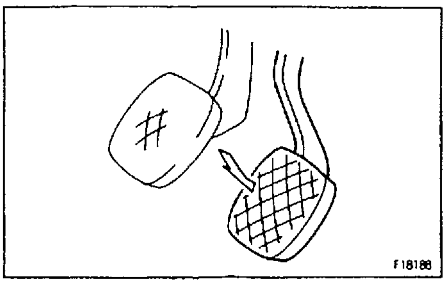
- **When carrying out free-fall operations, never remove your foot from auxiliary winch brake pedal ②.**
- **When carrying out free-fall operations, be careful of the following.**
  - **As a basic rule, the free-fall operation is used only when lowering the hook without a load, but if the free-fall operation is used when there is a load, the load must be less than 1/5 of the rated overall load, and the weight for each length of wire rope must be less than 600 kg (1323 lb).**
  - **Do not operate the lever or pedal suddenly.**
  - **Set the machine on firm horizontal ground with the outriggers fully extended.**
- **When operating the auxiliary winch clutch lever from the OFF position to the ON position, always move the lever to the bottom position and check that it is ON, then slowly release the auxiliary winch brake pedal. When releasing the pedal, apply the lock to the auxiliary winch clutch lever.**
- **Never carry out free-fall operations when the wire rope is pulled out to near the end of its maximum length or when carrying out work below ground level.**
  There is danger that the wire rope may break or be wound back on to the drum in reverse.

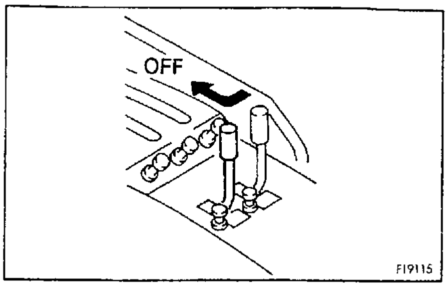


1. Set the lock pin of auxiliary winch clutch lever ① to the FREE position.



2. Depress auxiliary winch brake pedal ②.





3. Push auxiliary winch clutch lever ① to the OFF position. Keep auxiliary winch brake pedal ② depressed when doing this.

4. Adjust the amount that auxiliary winch brake pedal ② is depressed to control the down speed.

5. When the load comes near to the position where it is to be stopped, gradually depress auxiliary winch brake pedal ②.

REMARK

For reference, there is a yellow mark on the auxiliary wire rope over a range of approx. 80 m (262 ft) from the drum mount.

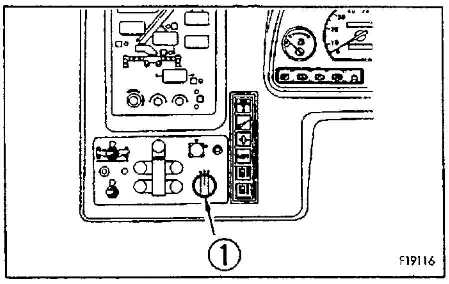
12.21 BOOM HOIST OPERATIONS

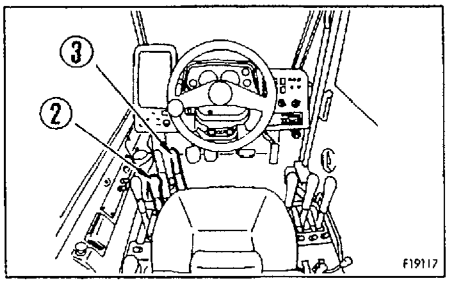
⚠ WARNING

- **There is danger of the machine overturning, so do not lower the boom beyond the danger angle in the rated overall load table.**

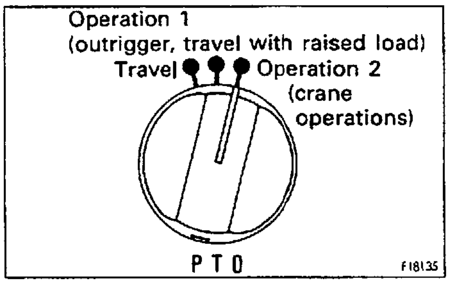
NOTICE

- **Be extremely careful when lowering the boom with a raised load. If the boom is lowered in this condition, the load will sway, and may cause overload.**
- **When lowering the boom, operate the lever slowly.**



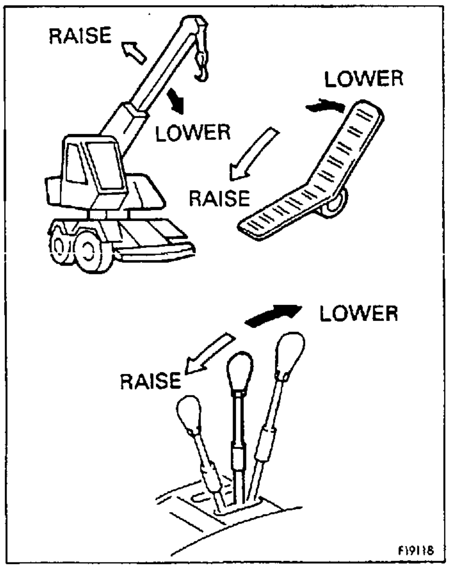


1. Set PTO switch ① to the "Operation 2" position.
2. Remove the lock pin from the hoist lever.



3. Operate boom hoist lever ② or pedal ③ as follows.

- Boom RAISE: Pull the lever back or depress the back of the pedal
- Stop: Set the lever and pedal to the neutral position. (Release the lever and pedal slowly.)
- Boom LOWER: Push the lever forward or depress the front of the pedal.

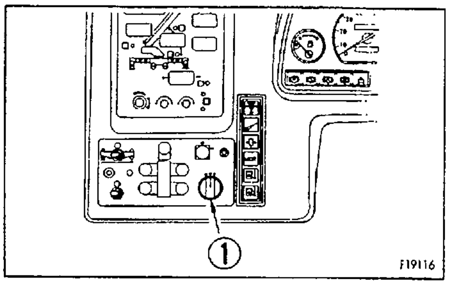


12.22 BOOM TELESCOPE OPERATIONS

⚠ WARNING

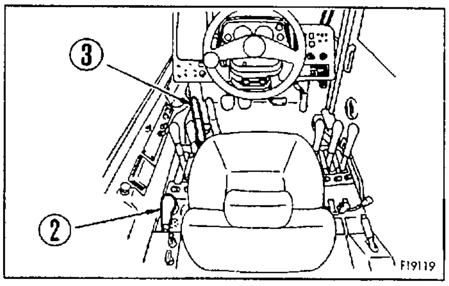
Precautions when operation

- **Do not pull the load sideways or pull it in.**
- **When the boom is extended or retracted, the hook is also wound in or out, so operate the winch at the same time to adjust the height of the hook.**
- **If the boom is kept extended for a long time, the change in the temperature of the hydraulic oil will cause the boom to retract slightly. If this happens, operate the boom telescope lever to extend the boom and maintain the position.**

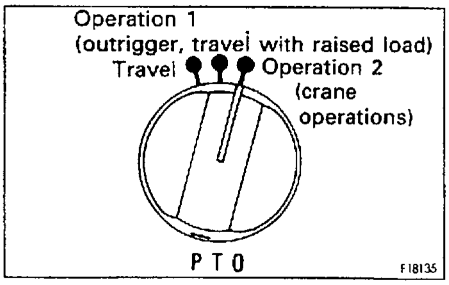


NOTICE

- **When extending the boom with a raised load, always be particularly careful to operate the lever slowly, regardless of the size of the load.**
- **When the boom is extended, the hook is wound in at the same time, so be careful not to overwind.**
- **The limit to which the boom can be extended or retracted with a raised load is the rated overall load for that working radius. Be extremely careful when extending the boom with a raised load because it is easy to cause overload.**

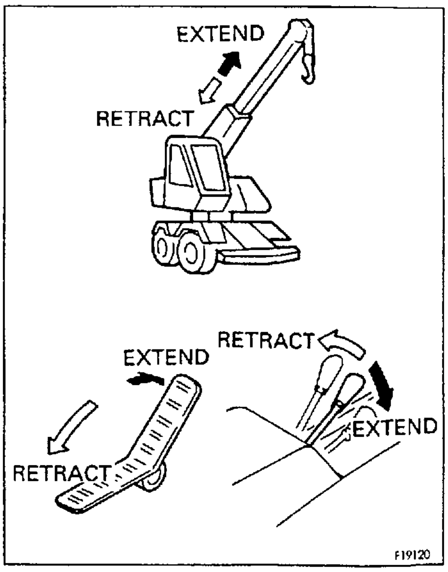


1. Set PTO switch ① to the "Operation 2" position.



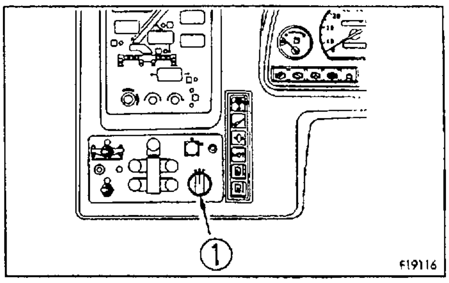
2. Operate boom telescope control lever ② or pedal ③ as follows.

- EXTEND: Push the lever down or depress the front of the pedal
- Stop: Set the lever and pedal to the neutral position. (Release the lever and pedal slowly.)
- RETRACT: Pull the lever up or depress the back of the pedal.

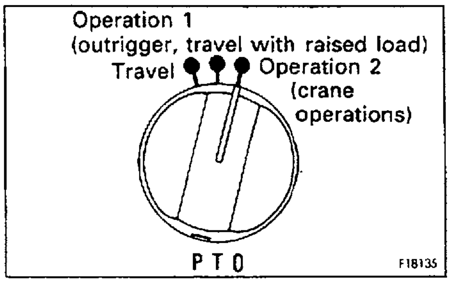


12.23 BOOM TELESCOPE SELECTOR OPERATIONS

If it is necessary to extend or retract the boom in adifferent way from the automatic telescope operation, such as when carrying out inspection and maintenance, use the boom selector switch to carry out the telescope operation.



- Set PTO switch ① to the "Operation 2" position.



12.23.1 POSITION OF BOOM SELECT SWITCH AND MOVEMENT OF BOOM

⚠ WARNING

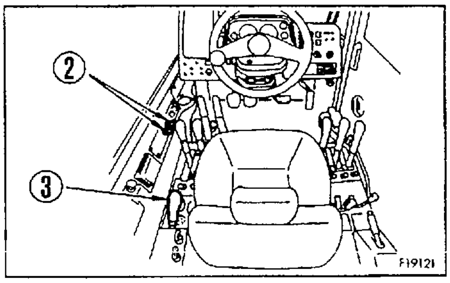
When operating the crane, never press the boom select switch. This may cause damage to the machine.

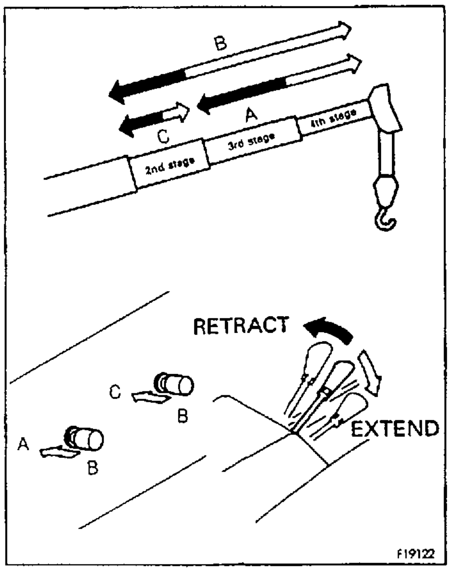
1. Operate boom select switch ② as follows.
- Position A
  The 3rd and top sections (3rd and 4th stages) are extended or retracted at the same time.
- Position B
  After the 2nd section (2nd stage) is extended, the 3rd and top sections are extended at the same time. When the boom is retracted, first the 3rd and top sections are retracted at the same time, then the 2nd section is retracted.
- Position C
  Only the 2nd section is extended or retracted.

2. Operate boom telescope lever ③.

NOTICE

For normal operations, do not touch the boom select switch.

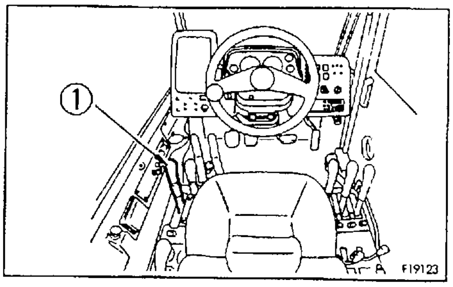


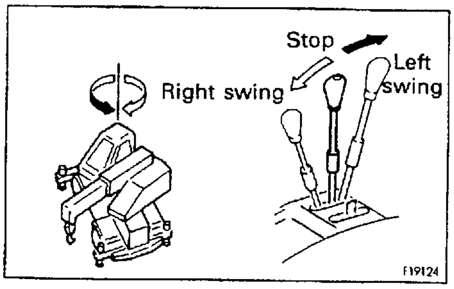


12.24 SWING OPERATIONS

⚠ WARNING

- **Before swinging, sound the horn to warn people around the machine.**
- **Operate the lever slowly.**
  It is particularly dangerous to operate the levers suddenly when a load is raised. This will cause the load to sway.
- **When there is a difference in the rated overall load between over-front and over-side operations and between over-rear and over-side operations, the buzzer will sound intermittently when swing operations are carried out in the range between the danger zone and 10° before the danger zone. In such cases, carry out the swing operation carefully or stop the swing operation.**





NOTICE

The rated overall load is different for over-front operations and 360° operations, so when swinging from the front to the side, be careful not to cause overload. Even if the alarm buzzer sounds, the swing operation is not stopped automatically, so stop the swing operation immediately.

When lifting a load off the ground at the front and swinging to the side, make sure to set the load shown in the rated overload load table for 360° operations when lifting the load off the ground at the front.

1. Before carrying out swing operations, check the following.
- Is the swing lock brake lever released?
- Is the swing lock lever released?
- Is the swing switch at the LOCK position?
- Remove the swing lever lock pin.

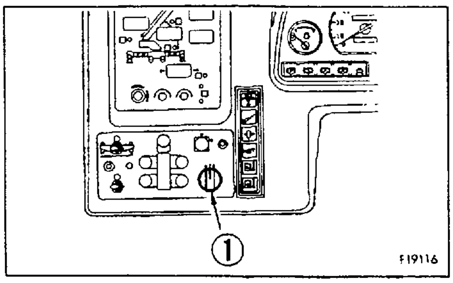
2. Operate swing control lever ① as follows.
- Left swing: Push the lever to the front
- Stop: Set the lever to the neutral position. (When the lever is released, the lever will return to the neutral position.)
- Right swing: Pull the lever back

REMARK

There is a horn switch at the top of the swing control lever for sounding the horn during swing operations.

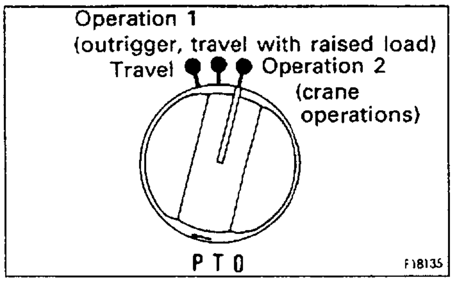
12.25 POWER TILT JIB HOIST OPERATIONS

> **⚠ WARNING**
>
> **When tilting with a raised load, run the engine at idling and carry out the operation slowly.**
> **When lowering the jib, the working radius will become larger, so be careful not to cause overload.**
> **Do not raise the jib to pull the load sideways or to pull it in.**



Before starting the operation, carry out the following preparations.

- Set PTO switch ① to the "Operation 2" position.
- Remove the lock pin from the power tilt jib control lever.

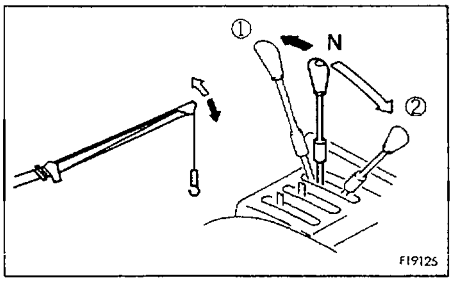


1. Operate the jib tilt.

①: Tilt LOWER
②: Tilt RAISE
N: The jib is stopped and kept at the same position.

REMARK

If the intermediate ring is loosened, the height of the lever can be adjusted freely, so set it to a suitable height.



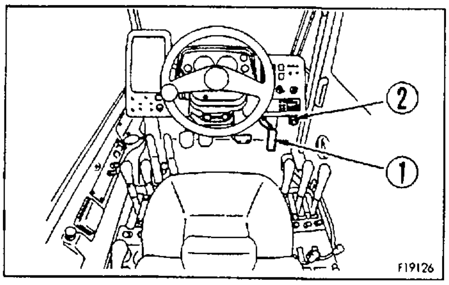
12.26 ADJUSTING OPERATING SPEED

⚠ WARNING

It is dangerous to operate the work equipment too fast.

Use the accelerator pedal or accelerator throttle knob to control the operating speed.

- If the operating speed is not constant, adjust the speed with accelerator pedal ①.
- If the operating speed is constant, use accelerator throttle knob ②. If the engine speed is set to a constant speed, the operating speed is also constant.



REMARK

Always use an operating speed which matches the operation. Reduce the speed when near the end of the operation, and set to high or low speed in accordance with the weight of the load.

12.27 PRECAUTIONS FOR OPERATION

12.27.1 REMOVING MAIN HOOK FROM TRAVEL POSTURE

1. Remove the hook lock pin.

2. Check that the auxiliary winch control lever is securely locked.

3. Release the main winch drum lock.
   Wind in the main hook slightly, and set the winch drum lock lever to the FREE position.

REMARK

Carry out the operation when the drum is locked.

4. Depress the main winch brake pedal, and set the main winch clutch lever to the OFF position to set to the free-fall condition. Keep the main winch brake pedal depressed when doing this.

5. Use the main winch brake pedal to control the tension of the wire, and operate the boom hoist lever to the BOOM RAISE position to raise the boom.

REMARK

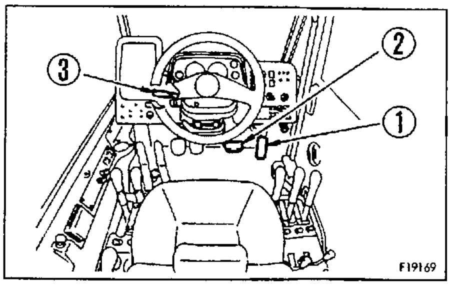
When doing this, be careful that the wire is not too tense or too slack.
If the wire is too slack, it will not wind on to the drum properly, and if it is too tense, there is danger that the weld at the hook holder link mount may be damaged.
If the main winch clutch lever is at the ON position and the main winch is wound out while raising the boom, there will be no tension (the weight of the hook) on the wire, so the rotation of the winch drum will cause improper winding of the loops of wire on the inside.

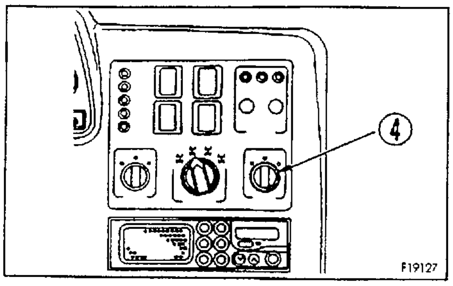
6. When the boom is raised to approx. 70°, stop the operation, set the main winch clutch lever to the ON position, then remove the main hook from the holder link.

12.28 PARKING MACHINE

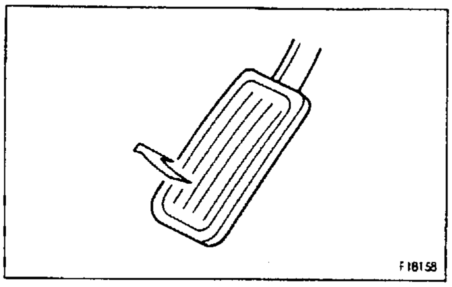
⚠ WARNING

- **Do not stop the machine suddenly except in emergencies. Use the braking force of the engine to slow down the machine before applying the foot brake, and leave room to spare when stopping.**
- **Park the machine on firm horizontal ground.
Do not park the machine on slopes.
If the machine must be parked on a slope, block the wheels to prevent the machine from moving.**
- **If the control levers are touched by accident, the machine may move suddenly.
When standing up from the operator's seat, tip the right control levers to the rear and place the lock pins of the winch clutch levers in the LOCK position.**

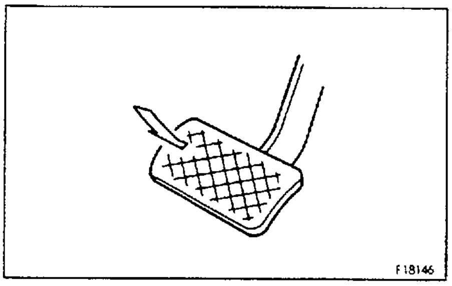




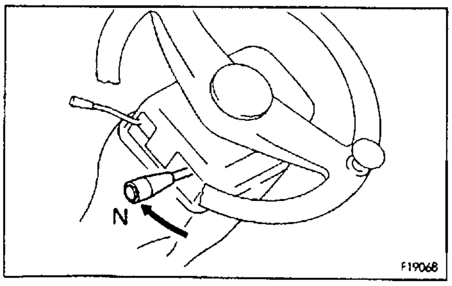
1. Release accelerator pedal ① and use the braking force of the engine to reduce the travel speed.



2. Depress brake pedal ② to apply the brake and stop the machine.



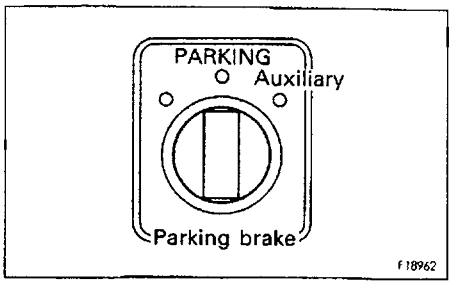
3. Move gear shift lever ③ to the N position.



4. Set parking brake switch ④ to the PARKING position.

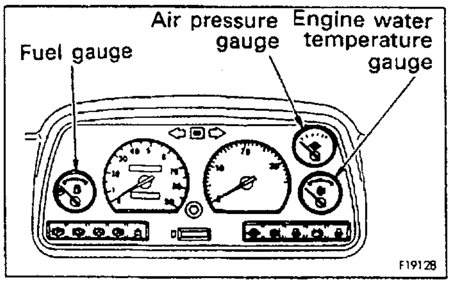
NOTICE

Except in emergencies, use the parking brake only when the machine has completely stopped.



12.29 CHECK AFTER FINISHING OPERATION

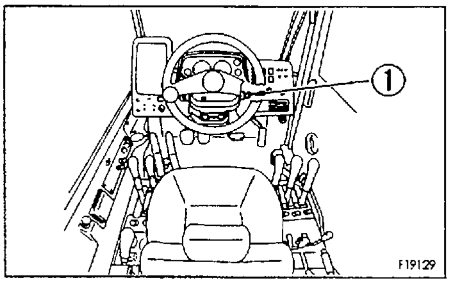
1. Use the meters and lamps to check the air pressure, engine water temperature, and fuel level.



12.30 STOPPING ENGINE

NOTICE

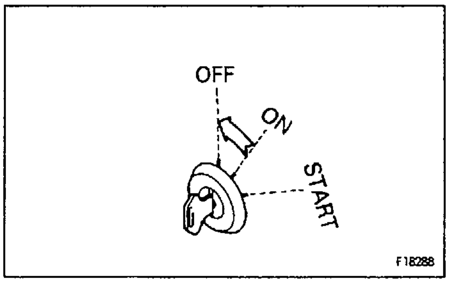
- **If the engine is stopped suddenly before it has cooled down, the life of all parts of the engine will reduced. Never stop the engine suddenly except in emergencies. If the engine has overheated, do not stop it suddenly, but run the engine at a midrange speed to cool it down gradually.**
- **Never change the set value for the engine speed. If there is some abnormality in the engine speed, please contact your Komatsu distributor.**
  Changing the engine speed setting will not only mean that the engine will not be able to display its ability, but will also lead to damage of the equipment.
- **Always apply the parking brake when leaving the machine.**



1. Run the engine at low idling for 5 minutes to cool the engine down gradually.

2. Turn the key in starting switch ① to the OFF position to stop the engine.

3. Remove the key from starting switch ①.



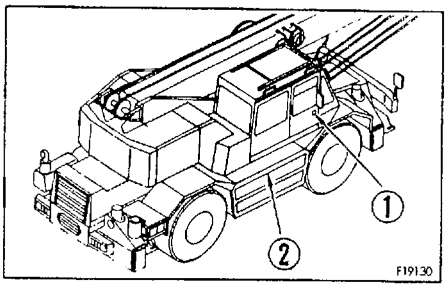
12.31 CHECK AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, body work, and undercarriage, and check also for leakage of oil and water. If any leakage or abnormality is found, carry out repairs.
2. Fill the fuel tank.
3. Remove any waste paper or dead leaves from inside the engine room. These may cause a fire.

12.32 LOCKING

Always lock the following places.

① Cab
② Fuel tank filler cap



12.33 HANDLING JIB

⚠ WARNING

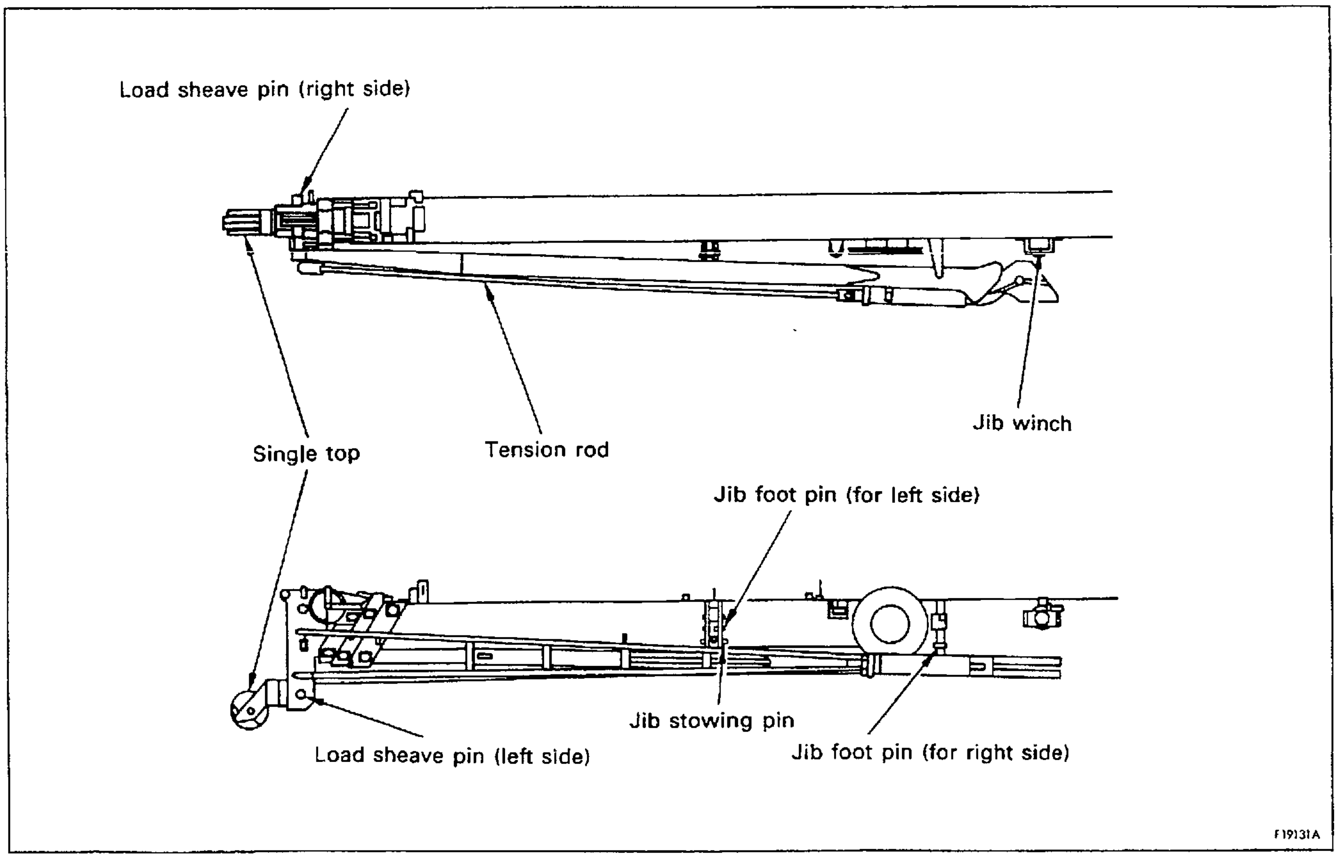
When carrying out jib operations, always follow the rated overall load table.

The following section gives the procedure for installing, stowing away, and tilting the jib, and the procedure for adjusting the jib length.

Order

- Names of parts needed when installing and stowing away jib: 2-133
- Precautions when handling jib: 2-134
- Preparations when installing and stowing away jig: 2-135
- Preparations for external control: 2-135
- Installing jib: 2-136
- Stowing away jib: 2-140
- Extending 2-stage jib: 2-144
- Retracting 2-stage jib: 2-145

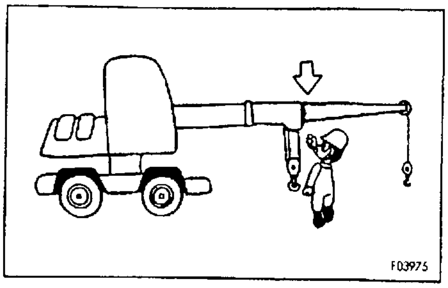
12.33.1 Names of parts needed when installing and stowing away jib


Load sheave pin (right side)
Single top
Tension rod
Jib winch
Jib foot pin (for left side)
Jib stowing pin
Load sheave pin (left side)
Jib foot pin (for right side)
F19131A

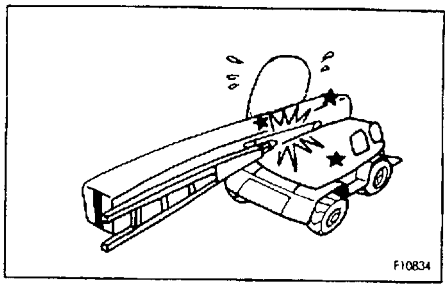
12.33.2 PRECAUTIONS WHEN HANDLING JIB

Be careful of the following points when handling the jib.

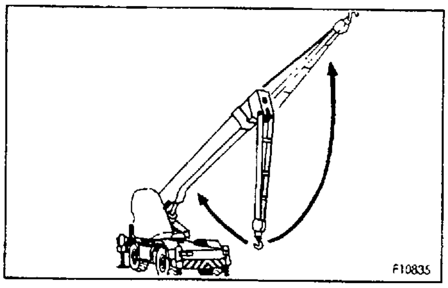
- Check that the pins have been completely inserted or removed.



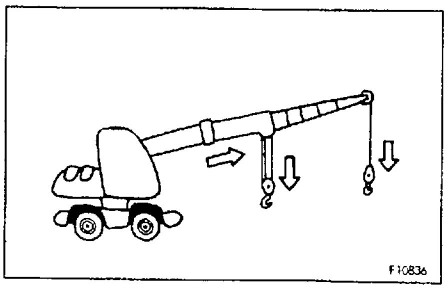
- When stowing away the jib, be careful not to wind in the jib winch rope too far.



- Check that there is no obstacle in the range for extending the jib.



- When extending the boom, be careful not to overwind the auxiliary hook or main hook.



NOTICE

Jib operations cannot be carried out when the outriggers are not extended (on-tire operations). Always set the outriggers. When raising the jib with the jib winch, do not go under the jib or put your hand between the jib and boom.

12.33.3 PREPARATIONS WHEN INSTALLING AND STOWING AWAY JIG

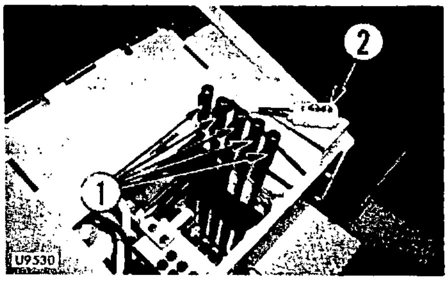
SETTING JIB MODE SWITCH

⚠ WARNING

When carrying out crane operations, always turn the mode switch OFF.

Before starting the operation for installing or stowing away the jib, turn the jib mode switch to JIB MODE.
With the jib mode, the overwind automatic stop is canceled within a boom length of 11.5 m (37.7 ft). Use it only when installing or stowing away the jib.

12.33.4 PREPARATIONS FOR EXTERNAL CONTROL



⚠ WARNING

- **During operations, there are processes where the jib comes close to the external control levers. Pay careful attention to the movement of the jib, and if it comes close, run the engine at low idling and carry out the operation slowly.**
- **Use the external controls for installing and stowing away the jib.**
- **When not using the jib winch, or after using it, stow away the remote control box to prevent mistaken operation.**
- **If the jib winch is used to keep the jib in position for a long time, leakage inside the motor will cause the jib to come down slowly, so when leaving the jib in position, secure it to the boom with the pin.**
- **Do not use the jib winch except when operating the jib.**

By using the external controls, it is possible to reduce the frequency of going in and out of the operator's cab, and it is also possible to watch the movement of the jib while operating it.

1. Insert levers ① and set them in position.

2. Take out jib winch remote control box ②.

12.33.5 INSTALLING JIB

1. Set the machine to the following posture.

(1) Move the single top out and take out the auxiliary hook.

(2) Set the OSS working mode to MAIN BOOM.

(3) Extend the outriggers fully, then extend the rear outrigger jacks fully and retract the front outrigger jacks so that the tires just touch the ground. When this is done, the OSS outrigger setting is reset and the condition is set to on-tire operations, so set it again.

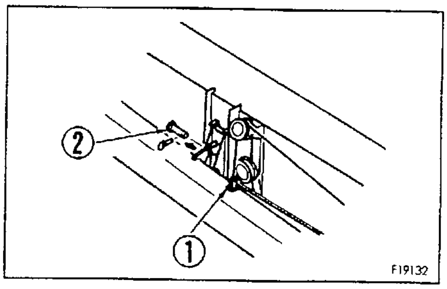
(4) Extend the boom 1 m (3.3 ft), then lower it completely.

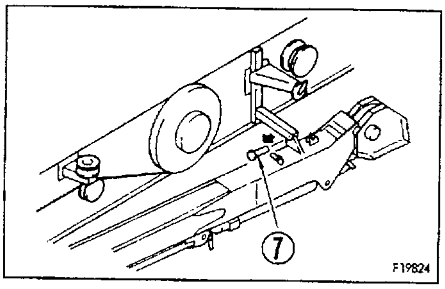
(5) Set the mode switch to JIB MODE.

2. Lower the jib from the side face of the boom to under the boom.

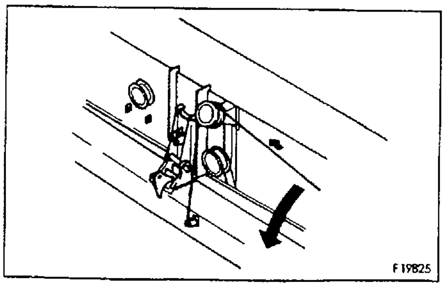
(1) Check that the jib winch rope is fitted to bracket ①, then wind in so that the jib is raised slightly.

(2) Remove jib foot pins ② and ⑦.

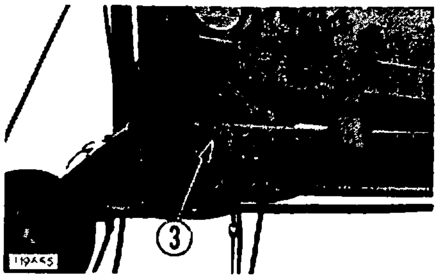




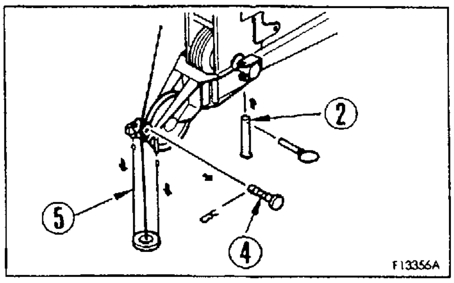
(3) Wind out the jib winch slowly to lower the jib under the boom.



(4) Retract the boom fully, and align the jib foot with load sheave pin ③ at the tip of the boom.



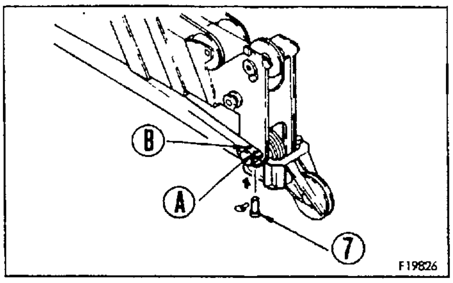
3. Set the pins to extend the jib.



⚠ WARNING

If pin ④ is not removed, it will be broken when the jib is extended, so do not forget to remove it.

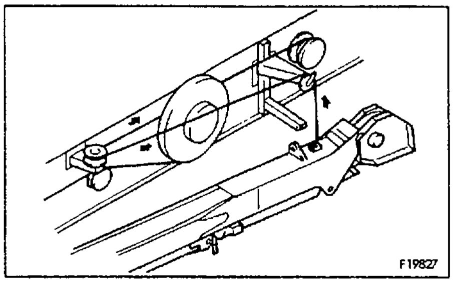
(1) Insert jib foot pin ② (removed in Step 2-2) from the bottom of the jib foot, and lock it with the stopper pin.
At the same time, insert jib foot pin ⑦ from the bottom of hole Ⓐ in the right jib foot, and lock it with the stopper pin.



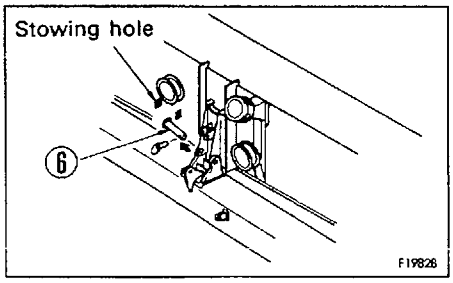
(2) Remove rope guide pin ④ from the single top.

(3) Disconnect the wire of overwind detection weight ⑤ from the single top.

(4) Fit the jib winch rope to the tip of the jib as shown in the diagram on the right, then wind in to raise the jib slightly. The jib will move slightly to the front.

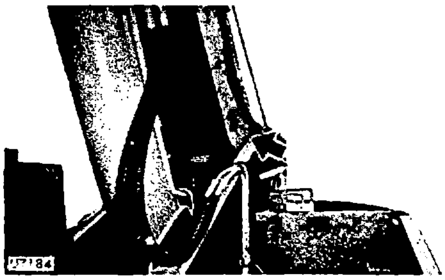


(5) Remove jib stowing pin ⑥ and insert it in the stowing hole on the side of the boom.



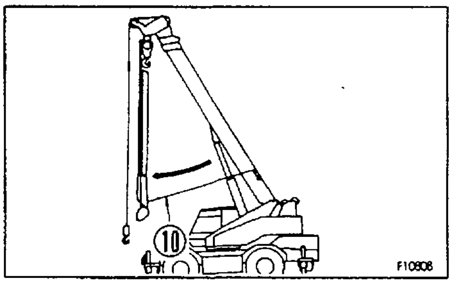
4. Disconnect the tip of the jib from the boom, and leave the jib hanging down.

(1) Operate the hoist lever and raise the boom until the mark at the boom foot can be seen.



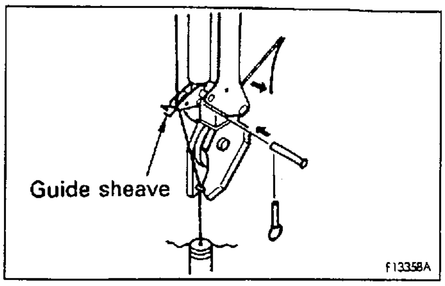
(2) Wind in to a point approx. 20 cm from the lower edge of the boom tip so that the main hook can go under the jib foot.

(3) Wind out the jib winch, move the jib to under the tip of the boom, then remove jib winch rope ⑩ from the jib.

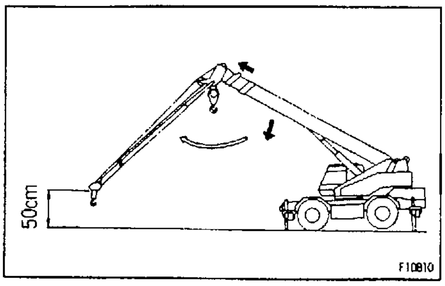


(4) Move the guide sheave up. (Power tilt machines only)

(5) Pass the auxiliary winch rope through the sheave at the tip of the jib. The overwind weight is on top of the auxiliary hook.



5. Swing the jib out to the front.



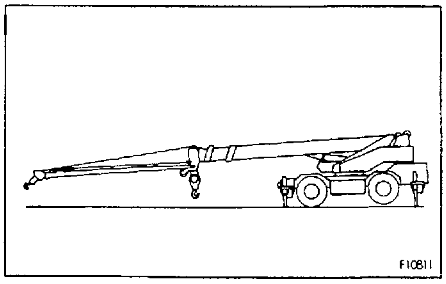
⚠ WARNING

- **Do not wind in the auxiliary winch rope to raise the auxiliary jib.**
  Always extend the boom to raise the jib.
  When doing this, operate so that the tip of the jib moves along a horizontal path approx. 50 cm (19.7 in) above the ground.
- **Be careful not to let the main hook touch the tip of the boom when it goes under the jib foot. When the main hook goes under the jib foot, wind out.**

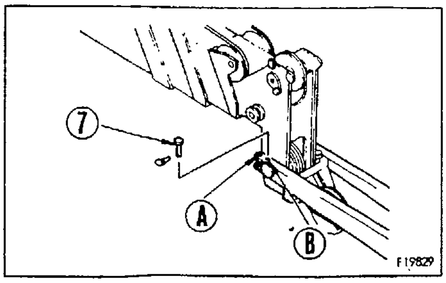
(1) Wind in the auxiliary winch rope until the auxiliary hook contacts the tip of the jib, then apply the lock to the auxiliary drum.

(2) If the boom is lowered while gradually extending the boom, the jib will start to rise.

(3) Extend the boom until the jib is more or less parallel to the boom.



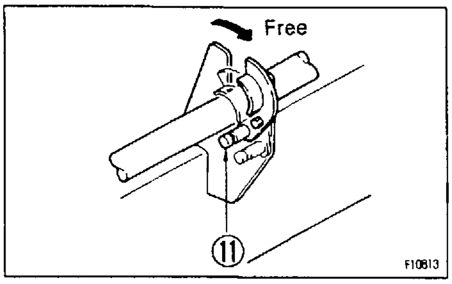
(4) Insert jib foot pin ⑦ (installed in Step 3-1) from the top of hole Ⓑ, then secure it with the stopper pin.



6. Set the tension rod in position.

U7185

(1) Pull knob ⑪ of the holders (left and right, 2 places) of the tension rod, and set the hook to the free position.

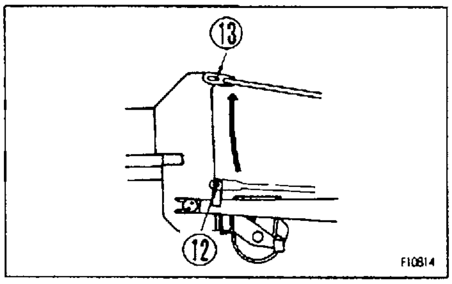


F10813

(2) Pull out pin ⑫ of the tension rod, and install the tension rod to boom tip ⑬.

REMARK

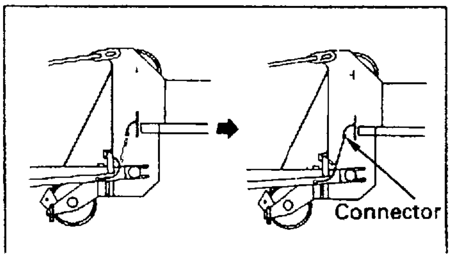
Install the tension rod on the opposite side in the same way. Use the steps installed to the chassis when carrying out the operation.



F10814

7. Set the overwind detection system and jib angle gauge cable (power tilt machines only) in position.

(1) Connect the connector for the overwind detection limit switch at the jib end.



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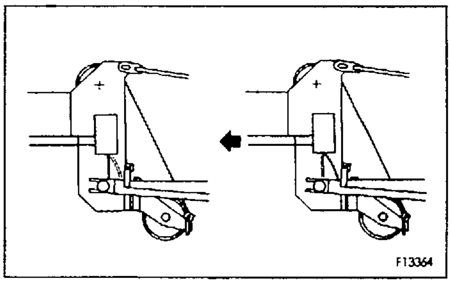
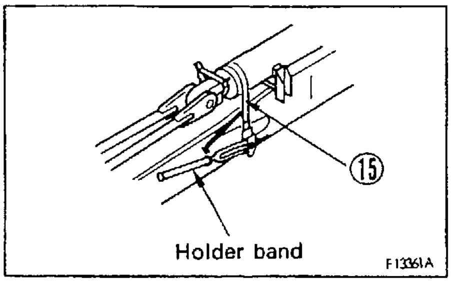
(2) Set the cable for the jib angle gauge to the jib foot. (Power tilt machines only)



F13364

8. Remove the tilt cylinder holder. (Power tilt machines only)

(1) Remove band ⑮ holding the tilt cylinder, and fit it to the side.



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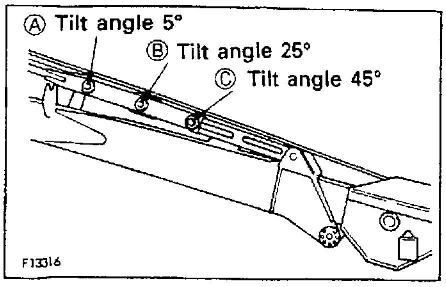
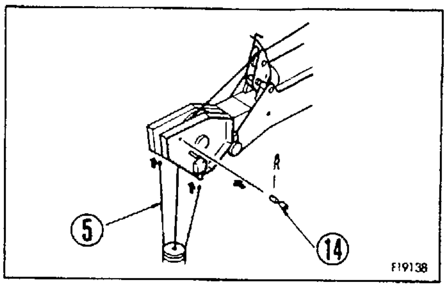
9. Set the tilt angle of the jib. (Manual jib machines only)
(1) Insert the jib tilt pin into one of holes Ⓐ, Ⓑ or Ⓒ to adjust the jib tilt angle.



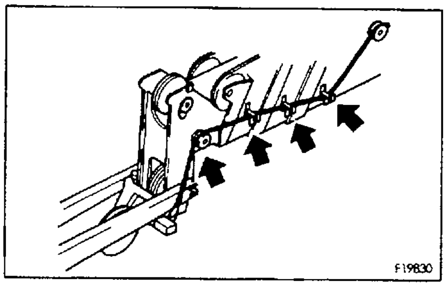
10. Set the overwind detection weight, tilt hose (power tilt machines only), and OSS in position.
(1) Remove the auxiliary winch drum lock, wind out the auxiliary winch rope, and disconnect the auxiliary hook from the tip of the jib.

(2) Set overwind detection weight ⑤ to the tip of the jib.

(3) Insert rope guide pin ⑭ (removed from the single top) to the sheave at the tip of the jib.



(4) Pass the tilt hose through the guide. (Power tilt machines only)



(5) Turn the mode switch from JIB MODE to OFF, and set the working mode switch to JIB. For details, see "12.36 SETTING OVERLOAD SAFETY SYSTEM (OSS)".

(6) Extend the outrigger jack cylinders at the front to make the machine horizontal, then stow the steps, rope, jib winch, and external control levers in the specified place.

12.33.6 STOWING AWAY JIB

1. Set the machine to the following posture.

(1) Set the OSS working mode to MAIN BOOM.

(2) Retract the 2-stage jib and set the jib tilt angle to 5°.

(3) Set the boom length to 11.1 m – 11.3 m (36.4 – 37.1 ft) and lower the boom completely.

(4) Retract the front outrigger jack so that the tires just touch the ground, then extend the rear outrigger jacks fully. When this is done, the OSS outrigger setting is set to on-tire operations, so reset it.

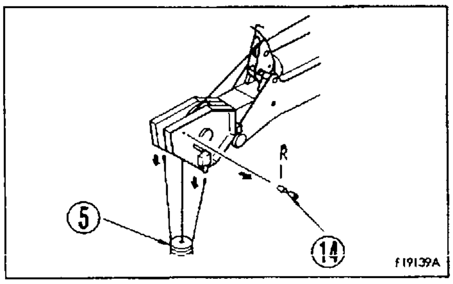
(5) Set the mode switch to JIB MODE.

(6) Pull the jib winch rope out to the condition in Step 5-3.

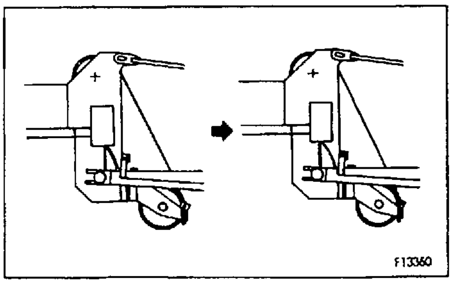
2. Remove the overwind detection weight.

(1) Remove rope guide pin ⑭ from the sheave at the tip of the jib.

(2) Remove overwind detection weight ⑤.
The weight fits on top of the auxiliary hook.



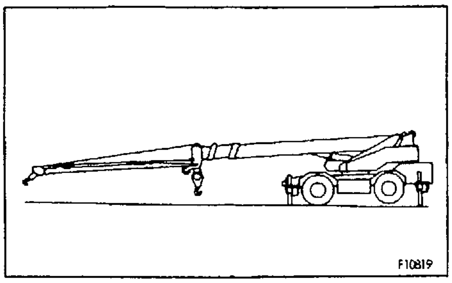
(3) Remove the cable of the jib angle gauge from the jib foot, and install it to the boom. (Power tilt machines only)



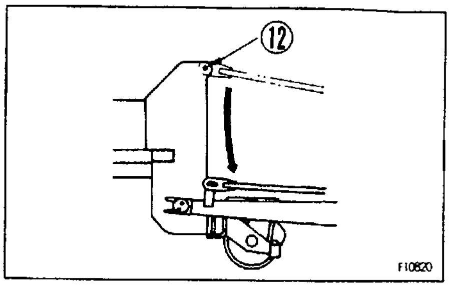
3. Stow away the tension rod and tilt hose (power tilt machines only).

(1) Wind in until the auxiliary hook contacts the tip of the jib, then apply the lock to the auxiliary winch drum.

(2) Extend the boom until the tension rod bends slightly.



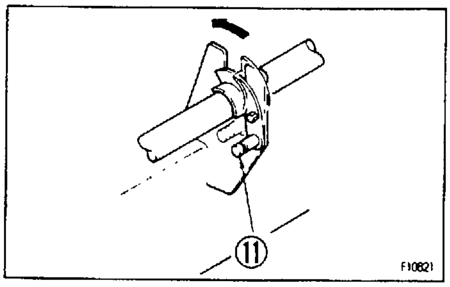
(3) Remove tension rod pin ⑫ from the tip of the boom and install it to the jib.



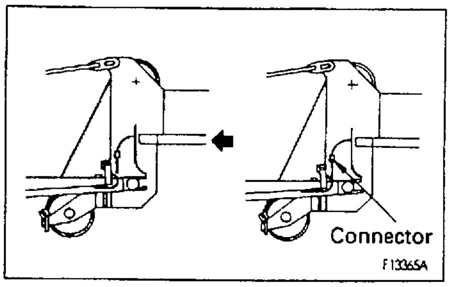
REMARK

Install the tension rod on the opposite side in the same way. Use the steps installed to the chassis when carrying out the operation.

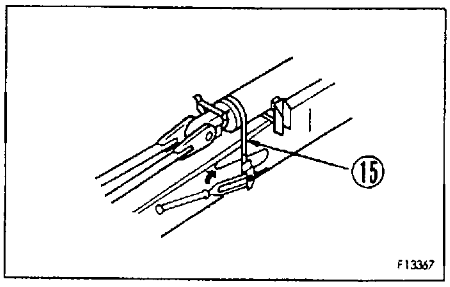
(4) Pull knob ⑪ of the holders (2 places) and fit the hook to the tension rod.



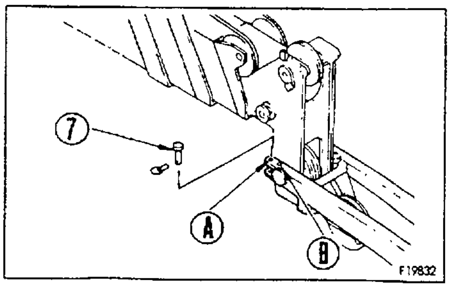
(5) Remove the connector of the overwind detection limit switch on the jib and fit the single top connector.



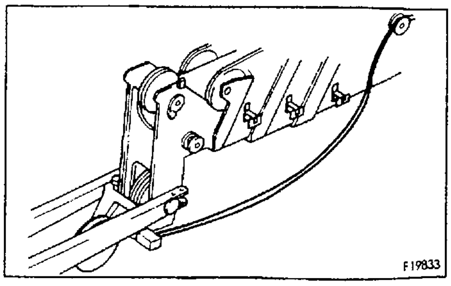
(6) Secure the tilt cylinder with holder band ⑮. (Power tilt machines only)



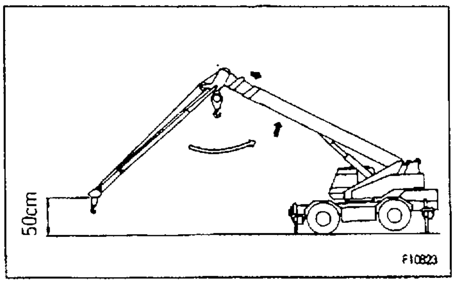
(7) Remove jib foot pin ⑦ from hole Ⓑ, insert it from the top into hole Ⓐ, then secure it with the stopper pin.



(8) Remove the tilt hose from the guide.(Power tilt machines only)



4. Let the jib hang down from the tip of the boom.



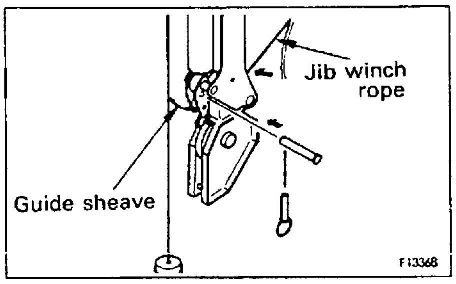
⚠ WARNING

When making the auxiliary jib perpendicular, do not loosen the auxiliary winch rope.
Retract the boom to make the jib perpendicular.
Be careful not to let the main hook contact the tip of the boom.

(1) Wind in the main hook to a point approx. 20 cm (7.9 in) from the bottom of the boom tip so that the main hook can go under the jib foot, then retract the boom while raising it.
When doing this, operate so that the tip of the jib moves along a horizontal path approx. 50 cm (19.7 in) above the ground.

(2) Set the auxiliary winch drum lock to the FREE position and loosen the auxiliary winch rope.

5. Set the jib to the bottom face of the boom.
(1) Remove the auxiliary hook from the tip of the jib.



(2) Stow away the guide sheave. If it is not stowed away, the bodywork will be damaged. (Power tilt machines only)

(3) Install the jib winch rope to the tip of the jib.

(4) Wind in the jib winch rope to a point where the jib foot goes under the main hook.

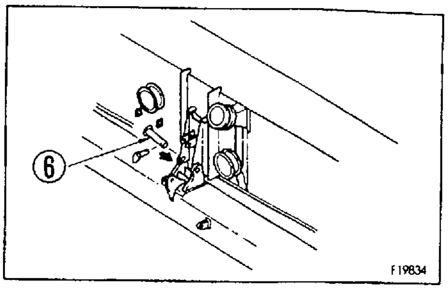
REMARK

When the main hook passes under the jib foot, wind out the main hook, and when the overwind condition is canceled, retract the boom completely.

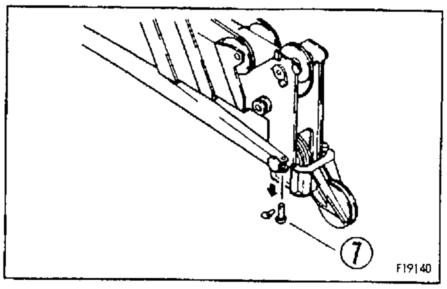
(5) Wind in the jib winch rope and fit the jib to the bottom face of the boom.

(6) Lower the boom to a horizontal position.

(7) Insert jib stowing pin ⑥.
Wind in the jib winch rope to align the mounting hole.

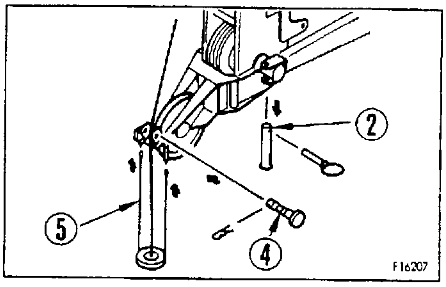


(8) Remove jib foot pin ⑦ on the right side.



(9) Install rope guide pin ④ and overwind detection weight ⑤ to the single top.

(10)Remove jib foot pin ② on the left side.



6. Raise the jib to the side face of the boom.

(1) Fit the jib winch rope to the new position.

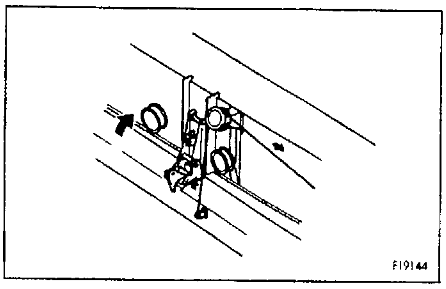
(2) Extend the boom approx.1 m (3.3 ft).

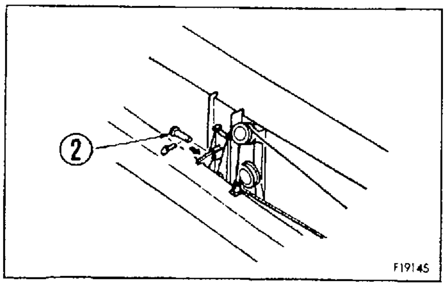
(3) Wind in the jib winch rope slowly to raise the jib to the side face of the boom.

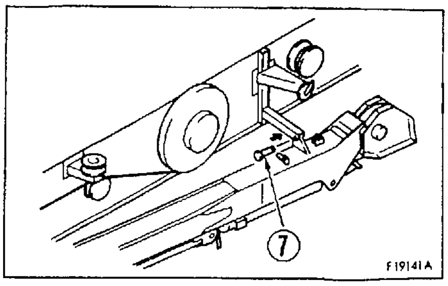
(4) Insert jib foot pins ② and ⑦.

(5) Loosen the jib winch rope slightly.

(6) Turn the jib mode switch from JIB MODE to OFF.







(7) Extend the outrigger jack cylinders at the front to make the machine horizontal, then stow the steps, rope, jib winch, and external control levers in the specified place.

12.33.7 EXTENDING 2-STAGE JIB

1. Carry out the following preparations.

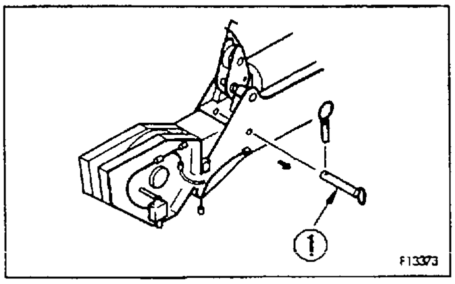
(1) Retract the boom fully and lower the boom to a point just before the tip of the jib contacts the ground.

(2) Set the overwind detection weight on top of the auxiliary hook, then wind in the auxiliary winch rope until it contacts the tip of the jib.

REMARK

When doing this, put the overwind detection weight on top the auxiliary hook.

(3) Remove the connector of the overwind detection limit switch at the tip of the jib.



2. Pull out the jib.

(1) Remove jib stopper pin ①.

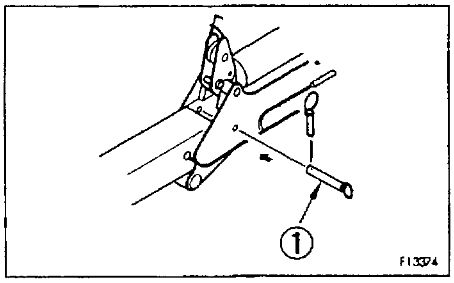
(2) When the auxiliary winch rope is loosened, the 2-stage jib comes out.

REMARK

Raise the jib while loosening the auxiliary winch rope, taking care not to let the tip of the jib touch the ground.
If it does not come out by itself, loosen the auxiliary winch rope and pull it out by hand.

(3) Insert jib stopper pin ①.

(4) Connect the connector of the overwind detection limit switch.



12.33.8 RETRACTING 2-STAGE JIB

1. Carry out the following preparations.

(1) Retract the boom fully and lower the boom to a point just before the tip of the jib contacts the ground.

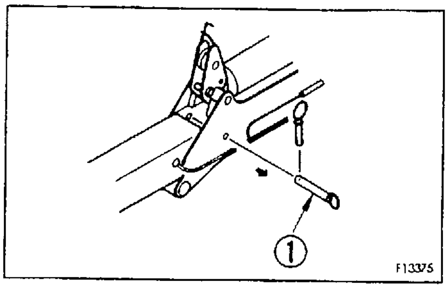
(2) Set the overwind detection weight on top of the auxiliary hook, then wind in the auxiliary winch rope until it contacts the tip of the jib.

(3) Remove the connector of the overwind detection limit switch at the 2-stage jib connection.

2. Retract the jib.

(1) Remove jib stopper pin ①.

(2) When the auxiliary winch rope is wound in, the 2-stage jib is stowed away.

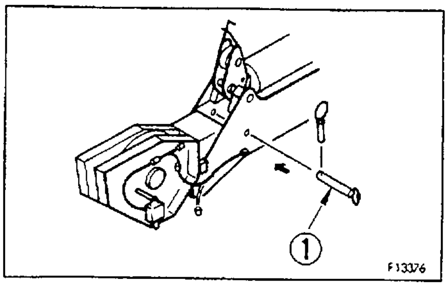


REMARK

When winding in the auxiliary winch rope, carry out the operation slowly.
Lower the boom gradually so that the tip of the jib moves horizontally.

(3) Insert jib stopper pin ①.

(4) Connect the connector of the overwind detection limit switch.



12.34 HANDLING SINGLE TOP

WARNING

Always follow the rated overall load table when carrying out single top operations.

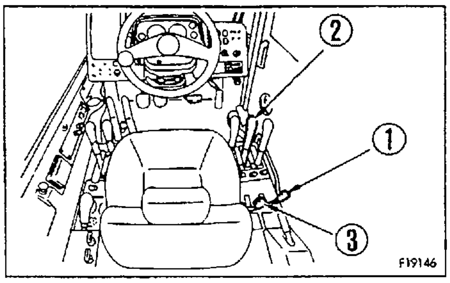
Use the single top to carry out efficient operations where the main boom is raising a light load and the lifting speed is fast.

12.34.1 EXTENDING SINGLE TOP

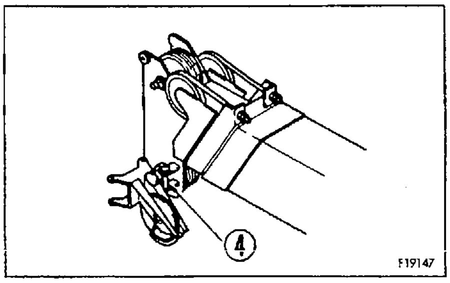
WARNING

Be careful when removing the stowing pin. Depending on the boom angle, the single top may extend under its own weight. Always install the stopper pin.

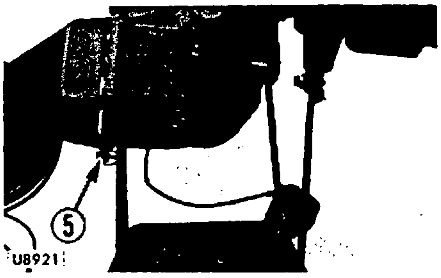
1. Extend the outriggers.
2. Set main winch clutch lever ① to the ON position and apply the lock.
   Lock main winch lever ②.



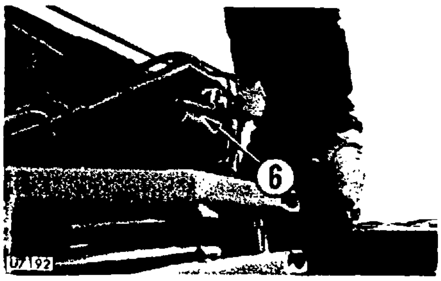
3. Set auxiliary winch clutch lever ③ to the OFF position and release the auxiliary winch brake pedal.
4. Remove the stopper pin stowed on the side of the boom, then remove stowing pin ④.



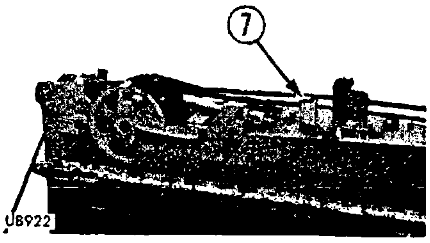
5. Rotate the single top to the front so that the bosses for the boom and single top are aligned, then insert stowing pin ⑤ and install the stopper pin.



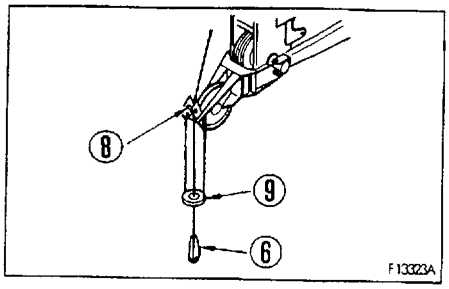
6. Remove socket ⑥ of the auxiliary winch wire rope.



7. Remove the auxiliary winch wire rope from semi-circular drum ⑦, then pass the wire rope through the auxiliary winch sheave (left side) of the top frame.



8. Remove single top rope guide pin ⑧, pass the wire through, then insert pin ⑧ and then insert the stopper split pin.
9. Hang overwind detection weight ⑨ from the single top.
10. Set the switch to SINGLE TOP. For details, see SETTING OVERLOAD SAFETY SYSTEM (OSS).
11. Set the auxiliary winch clutch lever to the OFF position, pull the wire out while raising the boom, then swing the boom to bring it to the auxiliary hook at the rear right, and install socket ⑥ to the auxiliary hook.
12. Set the auxiliary winch clutch lever to the ON position, wind in the winch, and take out the auxiliary hook.

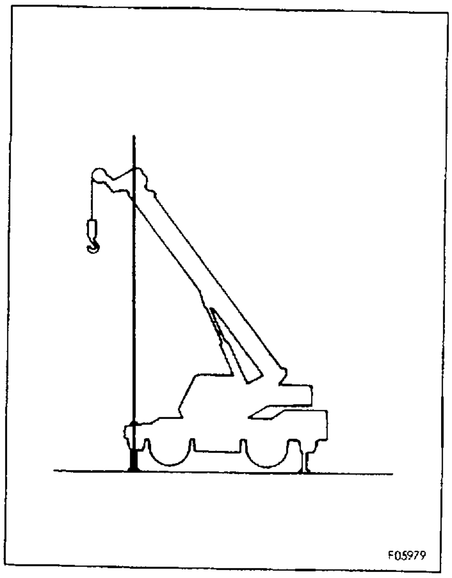


NOTICE

When pulling out the wire rope, set the auxiliary winch clutch lever to the OFF position, and pull the rope.
If the auxiliary winch lever is set to the WIND OUT position and the wire is pulled out, the wire rope on the inside of the drum will become loose and the wire rope will not lie properly, so do not use the auxiliary winch lever.

REMARK

When taking out the auxiliary hook, set the angle of the boom so that the auxiliary hook is outside the machine.



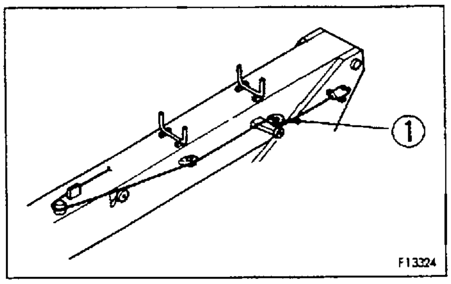
12.34.2 STOWING SINGLE TOP

WARNING

Do not wind in the wire rope too tight. Allow it to contact the top surface of the boom when the boom is horizontal.

Carry out this operation in the reverse order to setting the single top.

1. Stow away the auxiliary hook and remove the socket. When doing this, retract the boom fully.
2. Remove the wire rope from the single top and auxiliary winch sheave of the top boom, wind it round the bracket on top of the 1st boom, and secure the socket to the revolving frame stowing bracket.
3. Hook overwind prevention weight ① to the bracket.



4. Remove the stowing pin, rotate the single top body to the side of the boom, then insert the stowing pin.
5. Wind in the wire rope.

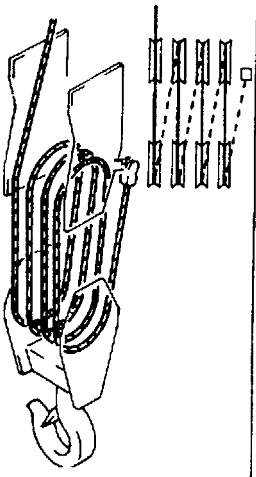
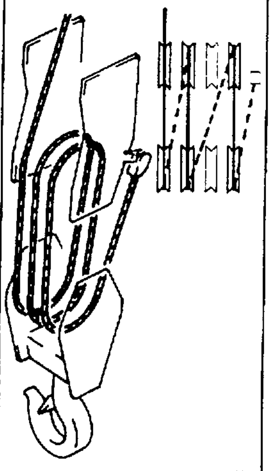
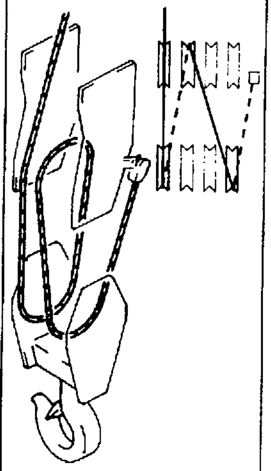
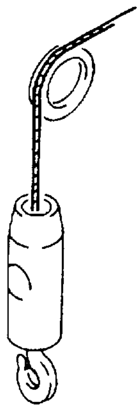
NOTICE

Make the winch lever as long as possible, and watch the auxiliary winch wire rope from outside the operator's compartment while winding on the wire rope.
If it is wound in fully, the semi-circular drum may be damaged.

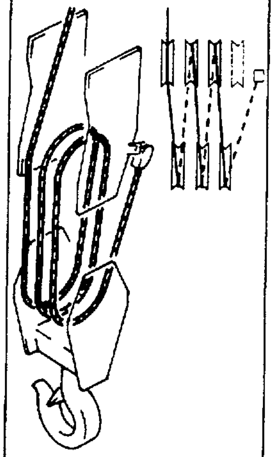
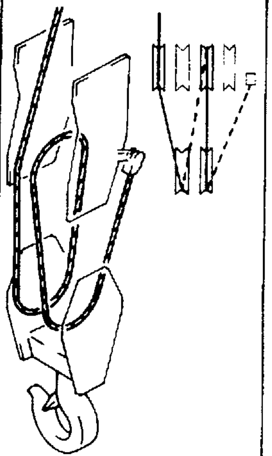
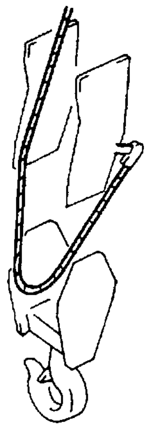
12.35 HANDLING WIRE ROPE

12.35.1 METHOD OF WINDING ON WIRE ROPE AND RATED OVERALL LOAD

- Determine the number of lengths of wire rope for the hook in accordance with the weight of the load being lifted, the length of the boom, and the winding-in speed.
- The weight for each length of wire rope should not exceed 3.25 tons.

No. of lengths of rope	8	6	4	1
Method of winding on rope	 F16199	 F16200	 F16201	 F16202
Rated overall load	Max. 25 ton	Max. 19.5 ton	Max. 12.5 ton	Max. 3 ton
Weight of hook	250 kg (550 lb)	250 kg (550 lb)	250 kg (550 lb)	60 kg (130 lb)

(When using optional hook)

No. of lengths of rope	6	4	2
Method of winding on rope	 F16203	 F16204	 F16205
Rated overall load	Max. 16 ton	Max. 12 ton	Max. 6 ton
Weight of hook	195 kg (430 lb)	170 kg (370 lb)	140 kg (300 lb)

12.35.2 REFITTING WIRE ROPE

⚠ WARNING

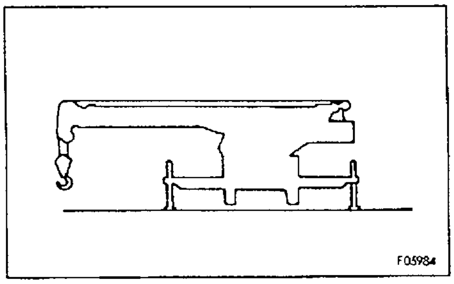
When removing or fitting wire rope, always wear thick leather working gloves.

When refitting the wire rope, do as follows.

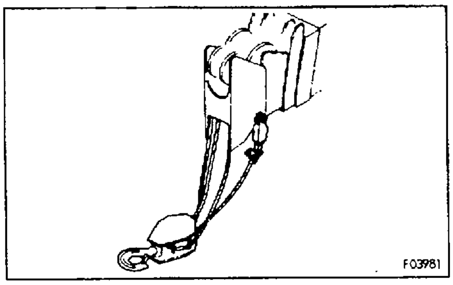
NOTICE

Be careful to wind on the rope so that it lies properly on the drum.

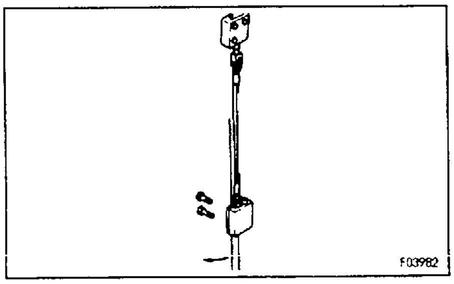
1. Extend the outriggers and fully retract the boom, then swing to the side or rear.



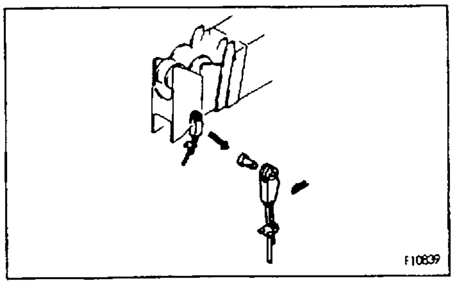
2. Lower the boom and lay the hook on the ground.
3. Set the clutch lever to the ON position.
4. Remove the wire rope guide.



5. Remove the weight of the overwind prevention system from the wire rope.



6. Remove the wire socket.
7. After removing the wire clip, use a hammer and ø10 – 14 mm (0.4 – 0.6 in) bar to remove the wire rope from the wire socket.
8. Refit the wire rope. For details, see METHOD OF WINDING ON WIRE ROPE.



12.35.3 REPLACING WIRE ROPE

As time passes, wire rope deteriorates because of fatigue, so replace the wire rope if it is in the following condition.

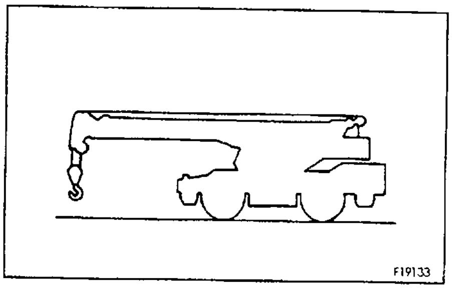
STANDARDS FOR REPLACING WIRE ROPE

- Wire rope where more than 10% of the wires in one strand (excluding filler wires) are broken.
- Wire rope where the wear diameter exceeds 7% of the nominal diameter.
- Wire rope which is twisted and has kinks.
- Wire rope with marked loss of shape or corrosion.
- Wire with abnormalities at the end stopper.

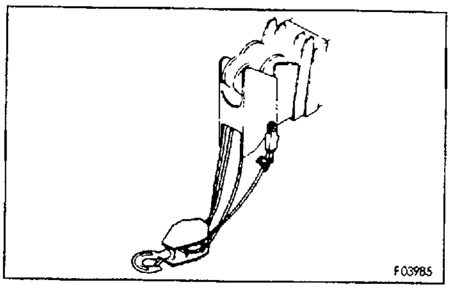
REMOVING WIRE ROPE

Remove the wire rope as follows.

1. Retract the boom fully and place the machine on firm horizontal ground.


F19133

2. In the condition shown in the diagram for Step 1, wind out the main winch and lay the hook on the ground.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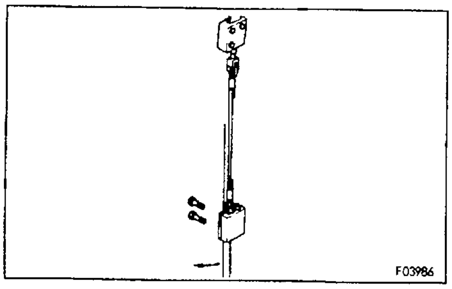
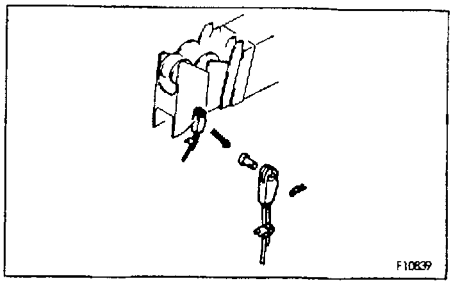
3. Remove the weight of the overwind prevention system from the wire rope.


F03986

4. Remove the wire socket.
5. After removing the wire clip, use a hammer and ø10 – 14 mm (0.4 – 0.6 in) bar to remove the wire rope from the wire socket.
6. Remove the wire rope from the hook.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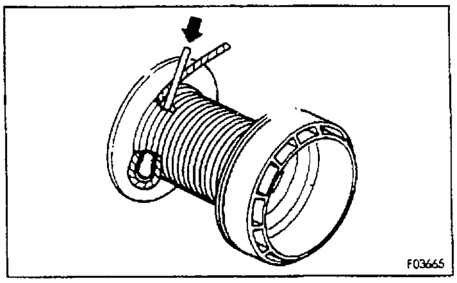
7. Wind out the main winch and remove the wire rope.
8. After winding the wire rope off the drum, use a hammer and bar to release the wire rope.
9. Remove all the remaining wire rope to complete the removal operation.

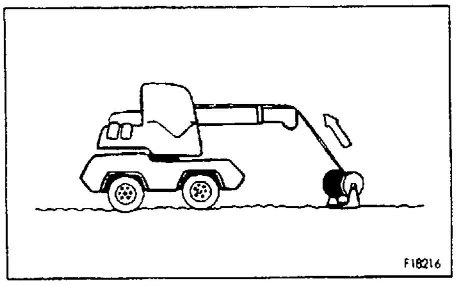


FITTING WIRE ROPE

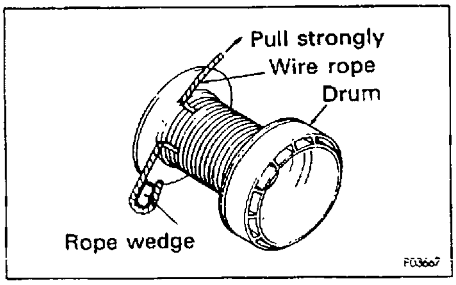
> **⚠ WARNING**
>
> - **Be sure to install the wire rope and rope wedge properly.**
> - **Be careful to wind in the rope so that it lies properly on the drum.**

Fit the wire rope as follows.

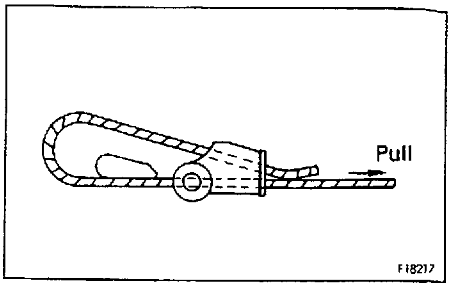
1. Take the end of the rope, and pass the rope through the load sheave at the tip of the boom, the idler sheave, rope guide, and winch drum guide sheave.



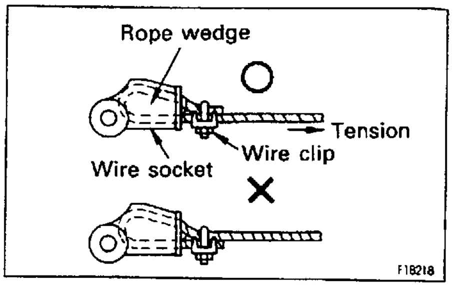
2. Pass the rope through the rope mounting hole on the drum, fit the wire on the rope wedge as shown in the diagram on the right, then pull strongly to secure the wire rope to the drum.
3. Wind in the winch slowly to wind the wire rope on to the drum.
4. Depending on the number of lengths of wire rope, pass the wire rope through the sheave at the tip of the boom and the hook sheave.

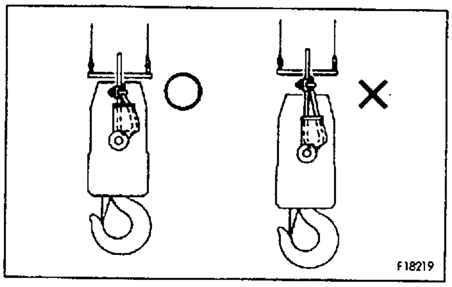


5. Install the wire socket and rope clip to the wire rope.



6. Install to the wire socket.
   When doing this, install the wire clip for the auxiliary hook in a position where it is not crushed by the overwind weight when the auxiliary hook is stowed away.



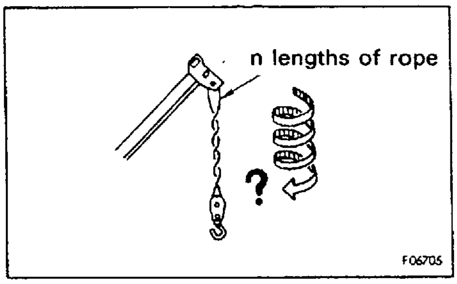


7. Raise the boom to a high angle, and wind out the winch so that only a few loops of wire rope remain on the drum.

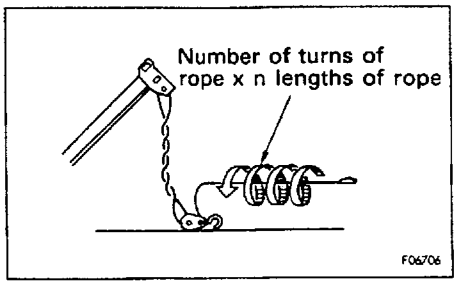
8. Apply tension to the wire rope, then wind in the winch to wind the wire rope neatly on to the drum.
   Apply a tension of approx. 1 ton for each length of wire rope.

12.35.4 ACTION WHEN WIRE ROPE IS TWISTED

1. Check how many turns the hook is twisted and in what direction it is twisted from the normal condition.



2. Lower the hook to the ground.
(If the rope cannot be wound out, lower or retract the boom to lower the hook.)
3. Remove the wire rope socket.
4. Forcibly twist the end of the wire rope the number of turns x number of lengths of wire rope in the direction that the hook is twisted (as checked in Step 1), and fit the wire rope.
5. Extend the boom fully, raise it to the maximum height, then wind in and wind out the hook several times repeatedly.
Apply tension to the rope and wind the rope neatly on to the winch drum.
6. Repeat the above procedure until the twisting of the hook is removed.
If the twisting cannot be removed using the above procedure, replace the wire rope with new wire rope.



REMARK

Reversing the winch drum end and hook end of the wire rope occasionally will extend the life of the wire rope.

12.36 SETTING OVERLOAD SAFETY SYSTEM (OSS)

12.36.1 PRECAUTIONS BEFORE OPERATING OSS

⚠ WARNING

Set the OSS correctly to match the crane operation.

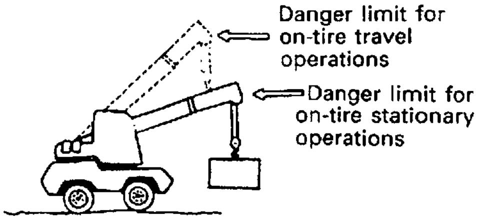
- **The OSS calculates the moment in accordance with the switch setting.**
  If the setting is different from the actual operation, the following problems will appear, so be extremely careful when setting the switches.

Example 1	**Actual work**	**Setting of switch**
Outriggers	**None**	**Max.**

  If the above setting is used, the outrigger extension width detection function will carry out the automatic stop for the work equipment.

Example 2	**Actual work**	**Setting of switch**
	On-tire travel	**On-tire stationary**

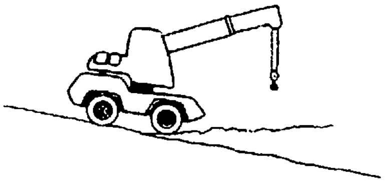
  If the above setting is used, the safety or danger will be judged for on-tire operations, so no warning or alarm will be given when the equipment approaches the danger zone.
  As a result, if the machine enters the danger zone, the machine may suddenly turn over without warning.


Danger limit for on-tire travel operations
Danger limit for on-tire stationary operations

⚠ WARNING

Operate the machine only on horizontal ground.

- **The OSS calculates the moment assuming that the machine is horizontal.**
  If the machine is not horizontal and operations are carried out, no warning or alarm will be given even when the machine approaches the danger zone.
  In addition, an excessive moment will act on the machine and this will cause damage or breakage of the work equipment.



12.36.2 SETTING OPERATING CONDITION OF MACHINE

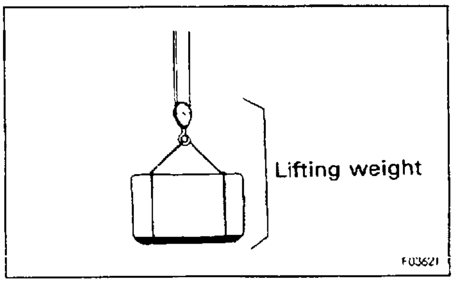
⚠ WARNING

- **The bottom row in the rated overall load table gives the danger angle. If the boom is lowered beyond this angle, even if there is no load, there is danger of the machine turning over, so never lower the boom beyond this angle.**
- **Never lower the boom suddenly. There is danger that the machine may overturn.**
- **Be careful when swinging a raised load, or when lifting a load off the ground, because the bending of the boom or tires will make the working radius larger.**
- **The rated overall load for boom operations is the value when the jib and single top are stowed away. If the boom is operated with these extended, the OSS will not work properly.**
- **The rated overall load is different according to the direction in which the work equipment is facing, so be extremely careful when checking the rated overall load.**

WHEN USING OUTRIGGERS

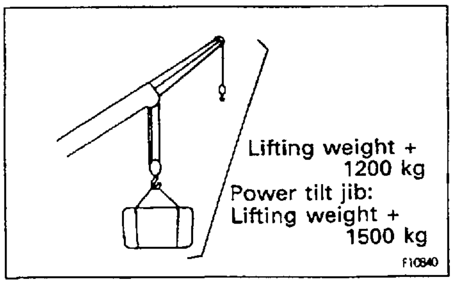
- **LIFTING WEIGHT**

The lifting weight is the value including the weight of the hook and the lifting equipment.

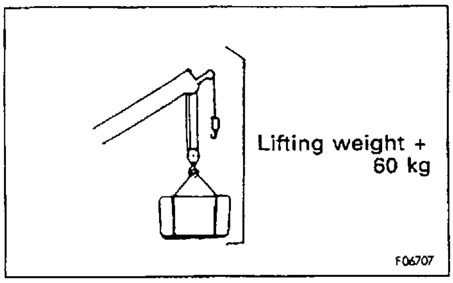


Type of hook	Main hook	Auxiliary hook
Weight of hook	250 kg (550 lb)	60 kg (130 lb)

If boom operations have to be carried out with the jib still installed, add 1200 kg (2600 lb) to the lifting weight for manual jib specification machines when checking the rated overall load.
For power tilt jib specification machines, add 1500 kg (3300 lb) to the lifting weight when checking the rated overall weight table.



If the boom operations have to be carried out with the single top extended and the auxiliary hook installed, add 60 kg (130 lb) to the lifting weight when checking the rated overall weight table.

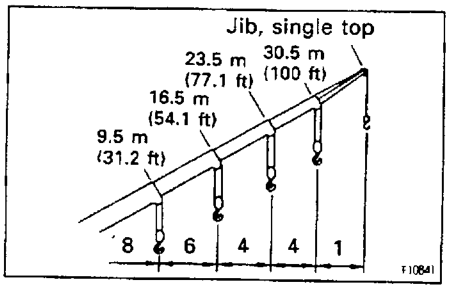


- **Number of lengths of rope**

⚠ WARNING

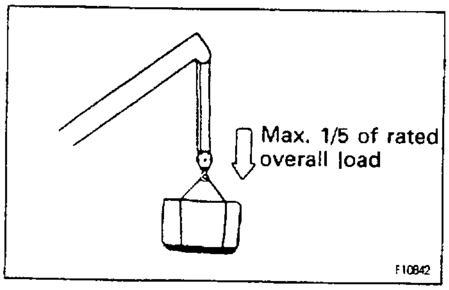
Set the OSS controller accurately for the number of lengths of rope actually used for the hook.

When selecting the minimum number of lengths of rope for the hook, use the table below and calculate the number of lengths of rope which will give a maximum weight of 3.25 tons for each length of wire rope for the main hook and 3 tons for each length of wire rope for the auxiliary hook.

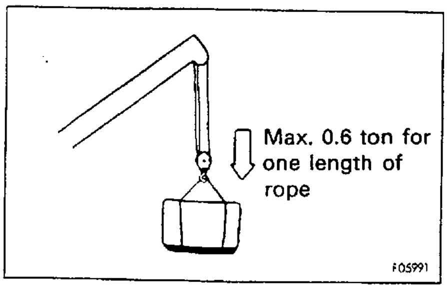


Type of boom	Boom				Jib	
Length of boom	9.5 m (31.2 ft)	9.5 m (31.2 ft) to 16.5 m (54.1 ft)	16.5 m (54.1 ft) to 23.5 m (77.1 ft)	23.5 m (77.1 ft) to 30.5 m (100 ft)	30.5 m (100 ft) + 7.8 m (25.6 ft)	30.5 m (100 ft) + 12.8 m (42 ft)
No. of lengths of rope	8	6	4	4	1	1

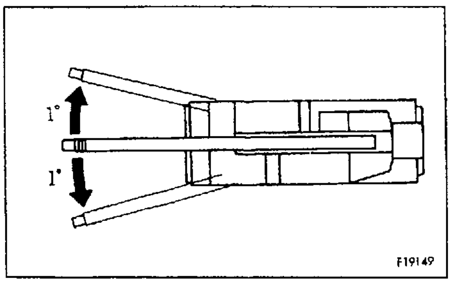
- **FREE-FALL OPERATIONS**
When carrying out free-fall operations, keep the weight of the raised load to less than 1/5 of the value in the rated overall weight table.



When carrying out free-fall operations, keep the weight to within 0.6 tons for each length of wire rope.



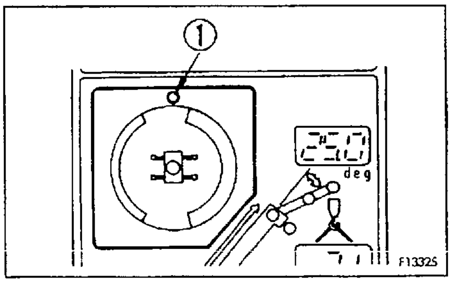
- **WHEN NOT USING OUTRIGGERS**



The rated overall load is different for over-front operations and 360° operations, so when swinging from the front to the side, be careful not to cause overload. Even if the alarm buzzer sounds, the swing operation is not stopped automatically, so stop the swing operation immediately.
When lifting a load off the ground at the front and swinging to the side, make sure to set the load shown in the rated overload load table for 360° operations when lifting the load off the ground at the front.

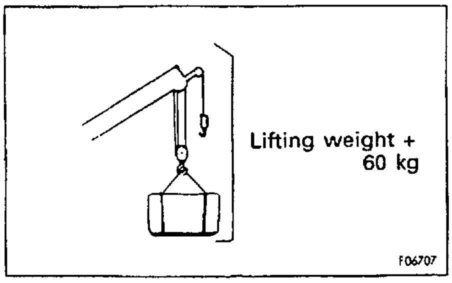
Do not carry out free-fall operations when using the jib.
Check that the tire inflation pressure is 784.5 kPa (8.0 kg/cm², 113.6 psi).
Carry out operations with the boom length at a maximum of 23.5 m (77.1 ft).
For details of the lifting weight and number of lengths of rope, see WHEN USING OUTRIGGERS.

- **WHEN USING OUTRIGGERS.**



When traveling with a raised load, travel at a maximum speed of 1.6 km/h and use the swing lock pin (when at front), and the swing brake.
Pilot lamp ① lights up in the front range.
When carrying out operations to the side or rear, check that the lamp has gone out.
If the pilot lamp lights up during operations to the side or rear, there is a failure in the OSS. Stop operations immediately.
If operations must be continued, use the values in the rated overall weight table for 360° operations.

If the boom operations have to be carried out with the single top extended and the auxiliary hook installed, add 60 kg (130 lb) to the lifting weight when checking the rated overall weight table.



12.36.3 SETTING OPERATING CONDITION AND SETTING OSS

When setting the machine condition and setting the OSS, do as follows.

Using the rated overall weight table and working radius/height diagram, check the boom length and outrigger extension width which will satisfy the operating conditions.

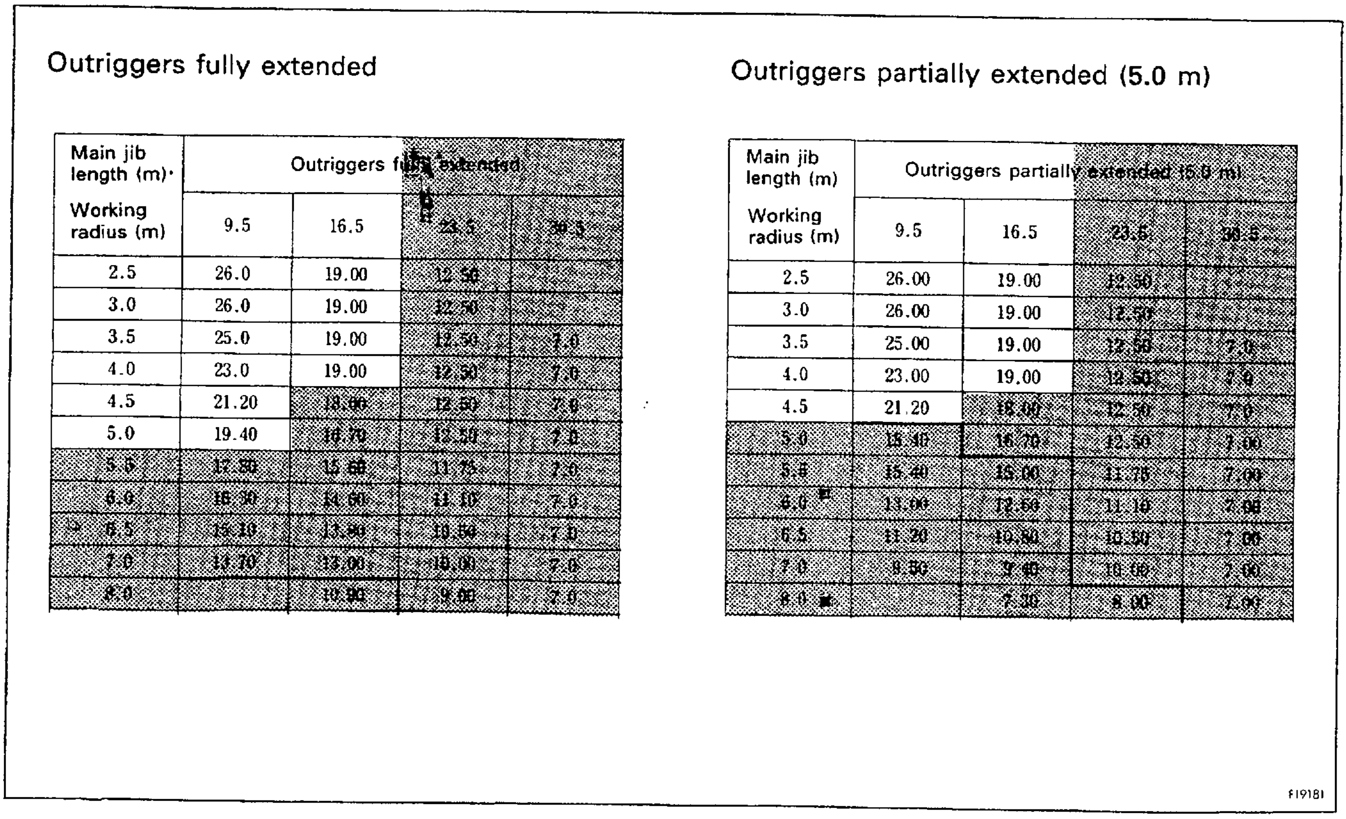
The rated overall weight table and working radius/height diagram are given under "24. SPECIFICATIONS".

The explanation here assumes the following operating conditions, and explains the procedure for confirming the boom length and outrigger extension width.

Example: Operating conditions

- Lifting height: 4 m (13.1 ft)
- Working radius: 5 m (16.4 ft)
- Lifting weight: 19 tons

1. Calculate the maximum possible range for the lifting weight. As can be seen from the weight table below, a lifting weight of 19 tons is possible for both a boom length of 9.5 m (31.2 ft) and 16.5 m (54.1 ft) when the outriggers are fully extended or partially extended.



Outriggers fully extended

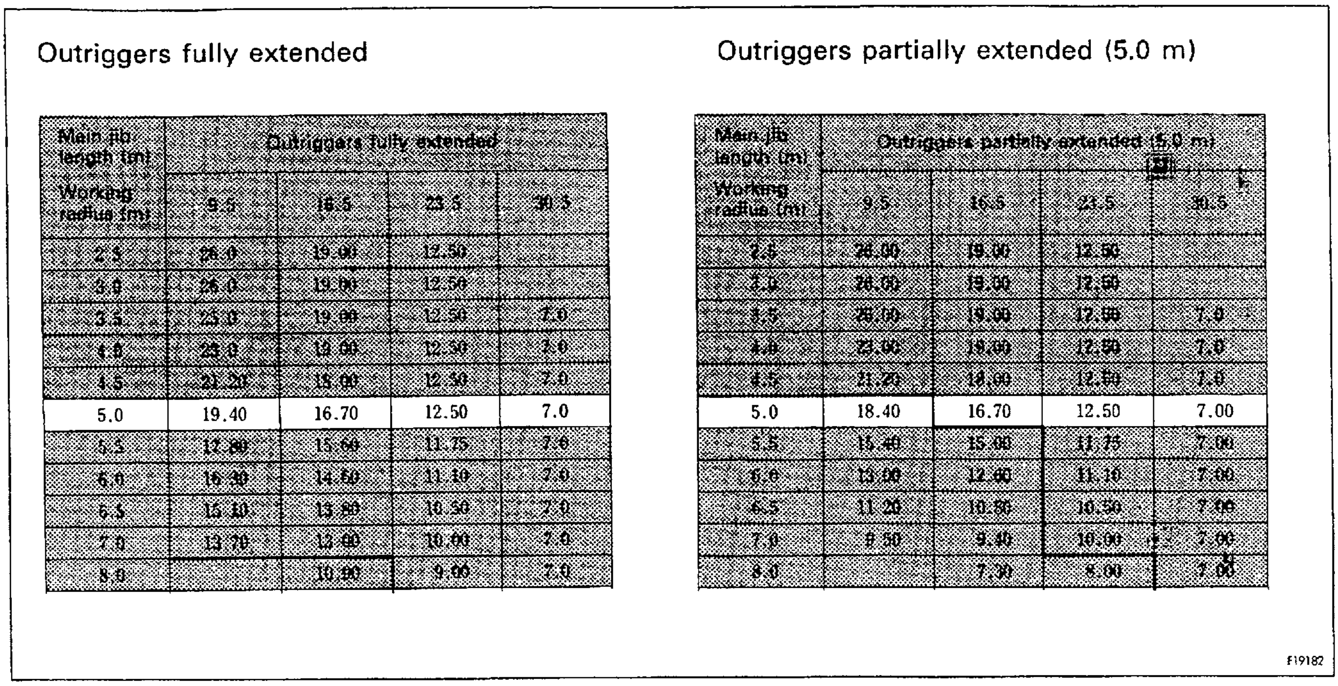
Main jib length (m) / Working radius (m)	Outriggers fully extended			
	9.5	16.5	23.5	30.5
2.5	26.0	19.00	12.50	
3.0	26.0	19.00	12.50	
3.5	25.0	19.00	12.50	7.0
4.0	23.0	19.00	12.50	7.0
4.5	21.20	18.00	12.50	7.0
5.0	19.40	16.70	12.50	7.0
5.5	17.80	15.60	11.75	7.0
6.0	16.30	14.60	11.10	7.0
6.5	15.10	13.90	10.50	7.0
7.0	13.70	13.00	10.00	7.0
8.0		10.90	9.00	7.0

Outriggers partially extended (5.0 m)

Main jib length (m) / Working radius (m)	Outriggers partially extended (5.0 m)			
	9.5	16.5	23.5	30.5
2.5	26.00	19.00	12.50	
3.0	26.00	19.00	12.50	
3.5	25.00	19.00	12.50	7.0
4.0	23.00	19.00	12.50	7.0
4.5	21.20	18.00	12.50	7.0
5.0	18.40	16.70	12.50	7.00
5.5	15.40	15.00	11.75	7.00
6.0	13.00	12.60	11.10	7.00
6.5	11.20	10.80	10.50	7.00
7.0	9.50	9.40	10.00	7.00
8.0		7.30	8.00	7.00

F19181

2. Calculate the maximum possible range for the lifting weight and working radius.
   If we look at the working radius of 5 m (16.4 ft), it can be seen that a lifting weight of 19 tons is possible with the outriggers fully extended and a boom length of 9.5 m (31.2 ft).
   (Impossible with outriggers partially extended/360° operation)



Outriggers fully extended

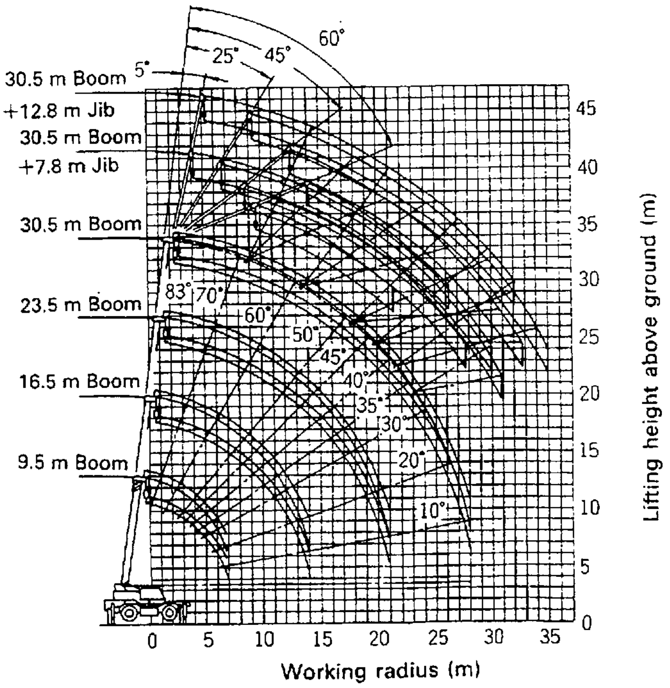
Main jib length (m) / Working radius (m)	Outriggers fully extended			
	9.5	16.5	23.5	30.5
2.5	26.0	19.00	12.50	
3.0	26.0	19.00	12.50	
3.5	25.0	19.00	12.50	7.0
4.0	23.0	19.00	12.50	7.0
4.5	21.20	18.00	12.50	7.0
5.0	19.40	16.70	12.50	7.0
5.5	17.80	15.60	11.75	7.0
6.0	16.30	14.60	11.10	7.0
6.5	15.10	13.80	10.50	7.0
7.0	13.70	13.00	10.00	7.0
8.0		10.90	9.00	7.0

Outriggers partially extended (5.0 m)

Main jib length (m) / Working radius (m)	Outriggers partially extended (5.0 m)			
	9.5	16.5	23.5	30.5
2.5	26.00	19.00	12.50	
3.0	26.00	19.00	12.50	
3.5	26.00	19.00	12.50	7.0
4.0	23.00	19.00	12.50	7.0
4.5	21.20	18.00	12.50	7.0
5.0	18.40	16.70	12.50	7.00
5.5	15.40	15.00	11.75	7.00
6.0	13.00	12.60	11.10	7.00
6.5	11.20	10.80	10.50	7.00
7.0	9.50	9.40	10.00	7.00
8.0		7.30	8.00	7.00

F19182

3. Calculate the maximum possible range for the lifting height.
   If can be seen that a lifting height of 4 m (13.1 ft) is possible with a boom length of 9.5 m (31.2 ft).



F19150

4. Condition of machine determined by Steps 1 – 3

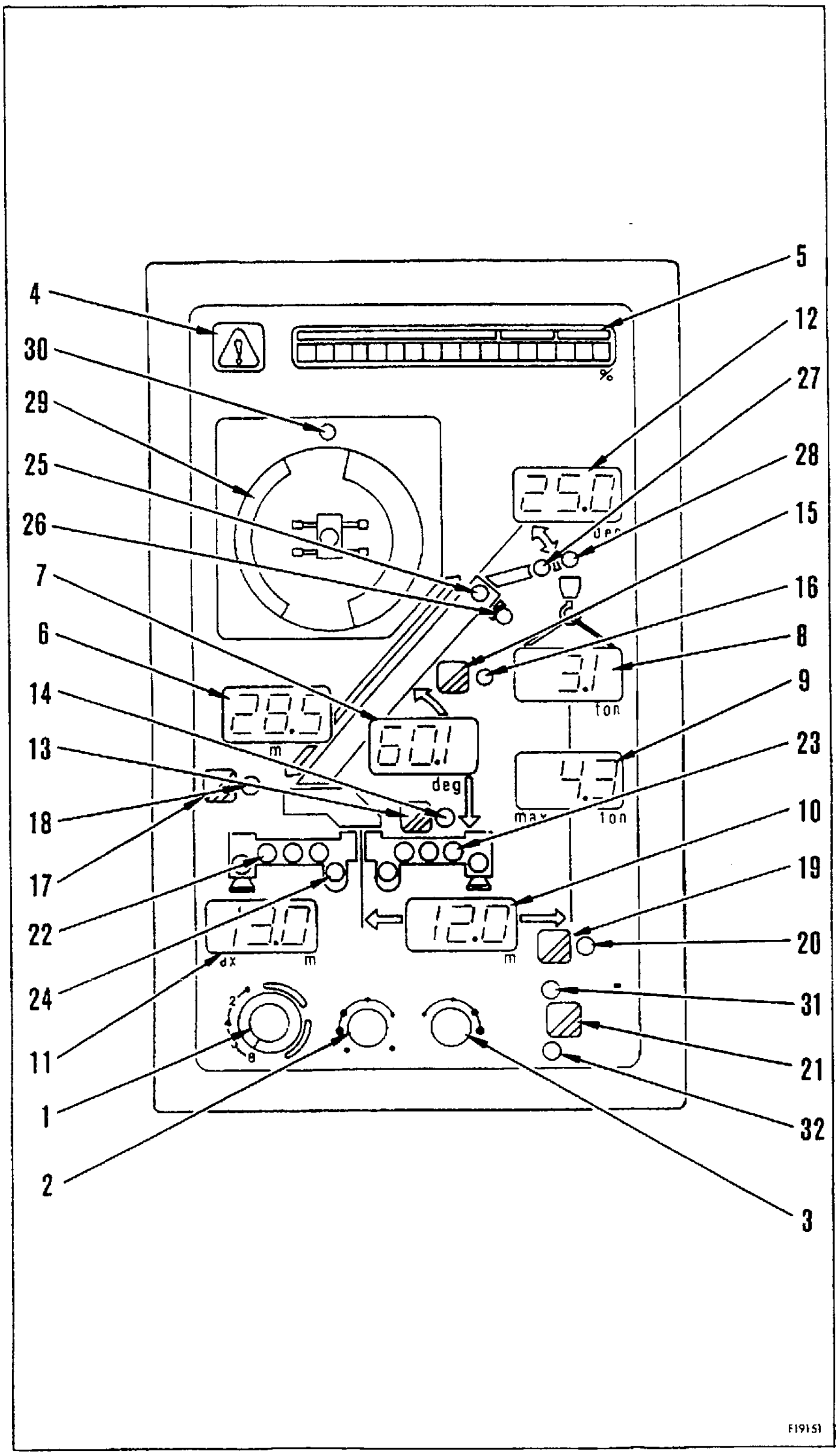
- Boom length: 9.5 m (31.2 ft)
- Outriggers: Extended fully

Set the machine in the above condition when carrying out the operation.

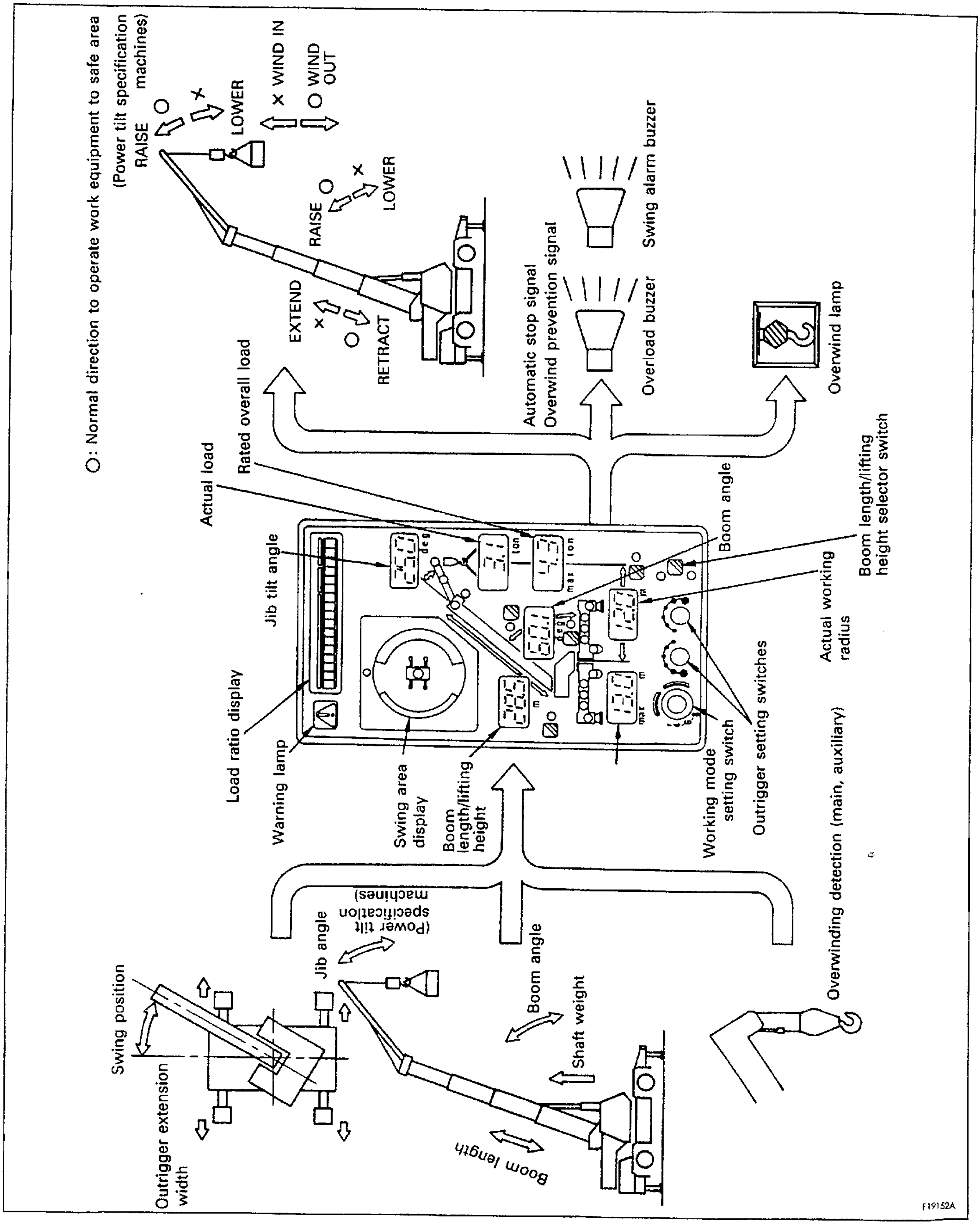
5. Set the OSS setting switches to match the machine condition.

12.36.4 GENERAL LOCATIONS ON OSS CONTROL PANEL

1. Working mode setting switch
2. Left outrigger setting switch
3. Right outrigger setting switch
4. Warning lamp
5. Load ratio display
6. Boom length (height) display
7. Boom angle display
8. Actual weight display
9. Rated overall load display
10. Actual working radius display
11. Rated working radius display
12. Jib angle display
13. Boom angle lower limit setting button
14. Boom angle lower limit display lamp
15. Boom angle upper limit setting button
16. Boom angle upper limit display lamp
17. Lifting height upper limit setting button
18. Lifting height upper limit display lamp
19. Working radius upper limit setting button
20. Working radius upper limit display lamp
21. Boom length/height selector button
22. Left outrigger display lamp
23. Right outrigger display lamp
24. On-tire display lamp
25. Boom display lamp
26. Single top display lamp
27. Jib 1st stage display lamp
28. Jib 2nd stage display lamp
29. Swing area display lamp
30. Front area display lamp
31. Boom length display lamp
32. Lifting height display lamp



12.36.5 PRINCIPLE OF OPERATION

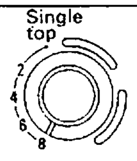
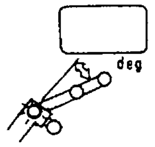
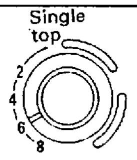
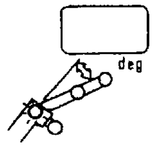
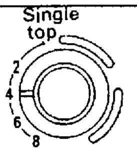
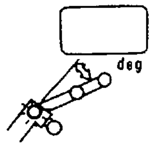
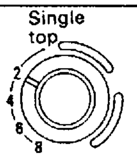
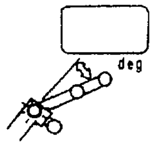
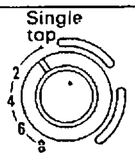
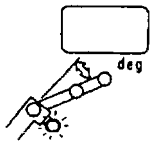


12.36.6 METHOD OF SETTING FUNCTIONS AND OSS

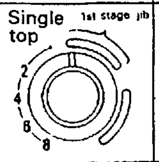
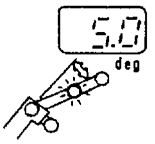
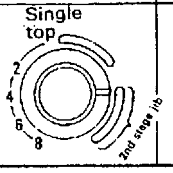
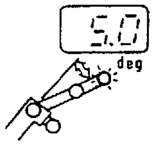
- **WORKING MODE SETTING SWITCH**

This switch is used to change the performance of the OSS according to the work equipment condition.
As the switch is turned, the display changes in turn, so always set to a position that matches the actual operating condition.

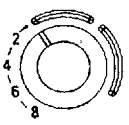
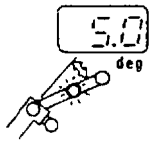
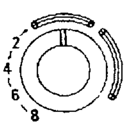
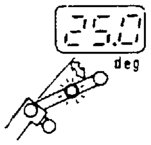
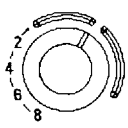
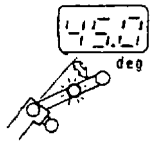
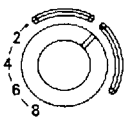
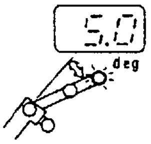
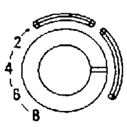
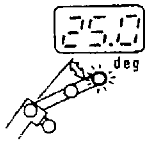
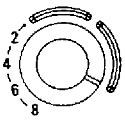
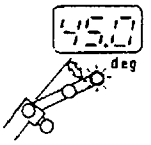
The display can be changed as shown below.

Applicable operation display	Switch	Display lamp
Boom operation, 8 lengths of wire rope		
Boom operation, 6 lengths of wire rope		
Boom operation, 4 lengths of wire rope		
Boom operation, 2 lengths of wire rope		
Single top operation		

Power tilt jib specification machine

Applicable operation display	Switch	Display lamp
1st stage jib operation		
2nd stage jib operation		

Manual jib specification machine

Applicable operation display	Switch	Display lamp
1st stage jib operation, tilt 5°		
1st stage jib operation, tilt 25°		
1st stage jib operation, tilt 45°		
2nd stage jib operation, tilt 5°		
2nd stage jib operation, tilt 25°		
2nd stage jib operation, tilt 45°		

The angle display during jib operations shows the operating angle at that point.

OUTRIGGER SETTING SWITCH

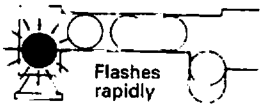
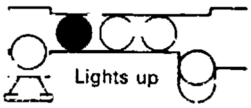
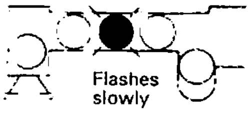
This switch is used to set the OSS condition to match the extension width of the outriggers, and it can be set individually on the left and right.
When the switch is turned, the display changes in turn, but if the setting is made in an unsafe area, a warning is given and the work equipment carries out an automatic stop at the same time, so always set to a position which matches the actual operating condition.

If the extension width of the outriggers is different at the front and rear, carry out the settings to match the shorter extension width.

If the setting of the outrigger setting switch is different from the actual amount of extension, the outrigger display will flash.

Rapid flashing:	The setting is larger than the actual situation. The setting is outside the safe area, so the work equipment is placed in the automatic stop condition.
Slow flashing:	The setting is smaller than the actual situation. The setting is inside the safe area, so operations are possible.

Example of display

Actual extension width	Setting of OSS	Outrigger display	
Partially extended (5.0 m (16.4 ft))	Fully extended		Automatic stop for work equipment
Partially extended (5.0 m (16.4 ft))	Partially extended (5.0 m (16.4 ft))		Operation possible
Partially extended (5.0 m (16.4 ft))	Partially extended (3.7 m (12.1 ft))		Operation possible

⚠ WARNING

Improper extension of the outriggers may lead to a serious accident or injury, so even if the OSS shows that the setting is possible, always check the outriggers visually.

When the PTO switch is turned on, for reasons of safety, the OSS outrigger mode is set to on-tire operations regardless of the position of the outrigger setting switch.

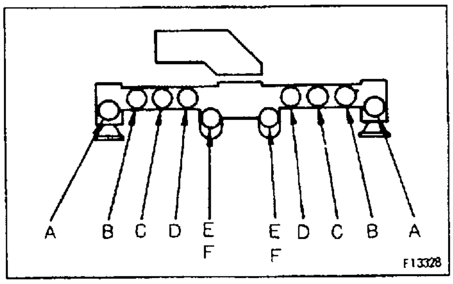
Before starting operations, always reset with the outrigger setting switch.

After the outriggers are extended, if the outriggers are operated, or the PTO switch is turned OFF and turned ON again, the setting will be switched to on-tire operations, but the condition can be reset by turning both the left and right switches.

REMARK

When the working mode setting switch is JIB, if on-tire operations are carried out, the E32 display is given. This error message is given because on-tire operations are prohibited when using the jib.

A: Fully extended 6.3 m (20.7 ft)
B: Partially extended 5.0 m (16.4 ft) (H-shaped outrigger machines only)
C: Partially extended 3.7 m (12.1 ft)
D: Minimum extension 2.2 m (7.2 ft)
E: On-tire stationary (lights up)
F: On-tire travel (flashes)

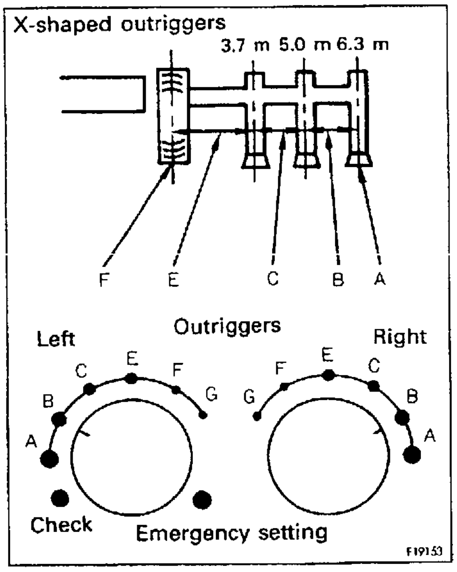


- Setting for X-shaped outrigger machines

REMARK

With X-shaped outrigger machines, there is no minimum extension for the outrigger. At the innermost position G of the outrigger setting switch, all the lamps will flash, but this position cannot be used.

A. (Fully extended): Set to this position when the outriggers are fully extended
B. (5.0 m, partially extended): Set to this position when the outriggers are extended between 5.0 m (16.4 ft) and 6.3 m (20.7 ft)
C. (3.7 m, partially extended): Set to this position when the outriggers are extended between 3.7 m (12.1 ft) and 5.0 m (16.4 ft)
E. (On-tire stationary): Set to this position for on-tire stationary operations
F. (On-tire travel): Set to this position for on-tire travel operations

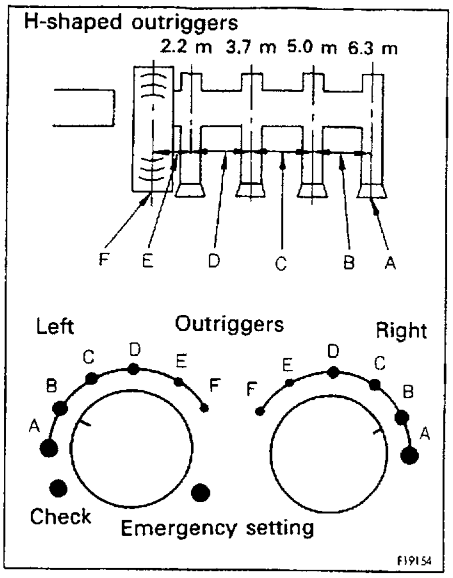


- Setting for H-shaped outrigger machines

REMARK

The settings for the H-shaped outrigger machines are the same as for the X-shaped outrigger machines, with the addition of minimum extension position D.

D. (2.2 m (7.2 ft), minimum extension): Set to this position when the outriggers are extended between 2.2 m (7.2 ft) and 3.7 m (12.1 ft)



- Emergency setting position

⚠ WARNING

If work has to be carried out at the emergency setting position, check the extension width of the outriggers and set the setting switch on the safe side.

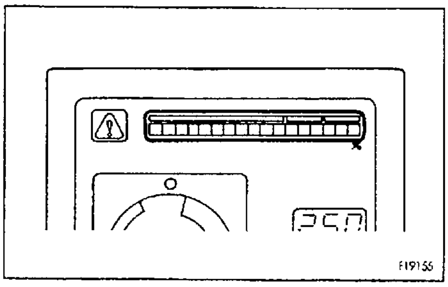
If an abnormality occurs in the outrigger extension width detection portion, the work equipment enters the automatic stop condition for safety reasons, and it is impossible to continue operations, this position can be used to input the settings manually without depending on the condition of the extension width detection function.

If the left setting switch is turned clockwise to the emergency setting position and is turned on three times within 3 seconds, the buzzer will sound and the warning lamp will flash to indicate the emergency setting condition. Operate the PTO switch or turn the key switch ON/OFF to return to the original condition.

- **LOAD RATIO DISPLAY**

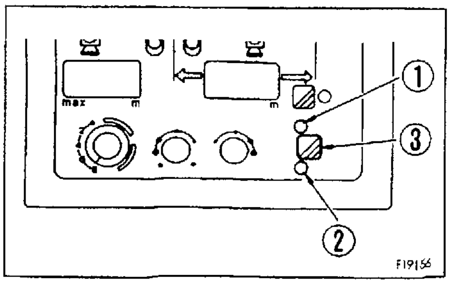
This shows the actual load (including the weight of the lifting equipment) as a percentage of the rated overall load.

Load ratio = Actual load/rated overall load x 100 (%)



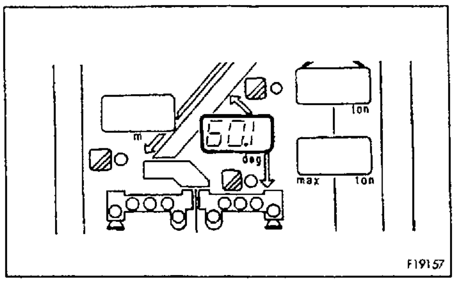
- **BOOM LENGTH (LIFTING HEIGHT DISPLAY)**

When boom length display lamp ① is lighted up, it shows the boom length, and when lifting height display lamp ② is lighted up, it shows the lifting height.
Operate boom length/lifting height selector button ③ to switch between the two displays.



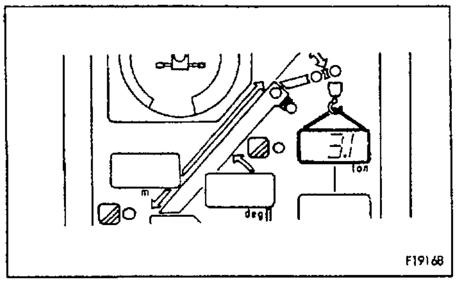
BOOM ANGLE DISPLAY

This displays the angle of the boom from the horizontal.



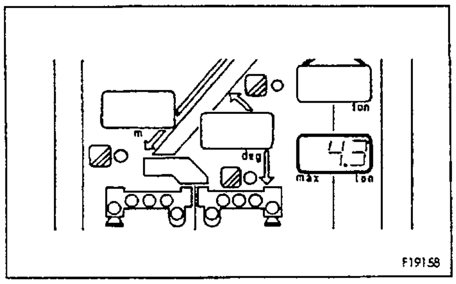
ACTUAL LOAD DISPLAY

This displays the weight of the load actually being lifted (including the weight of the hook and lifting equipment).



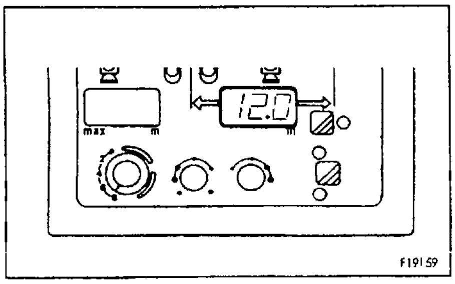
RATED OVERALL LOAD DISPLAY

This displays the rated overall load for the condition when operating.



ACTUAL WORKING RADIUS DISPLAY

This displays the actual working radius when operating. The displayed value includes the bending of the boom.

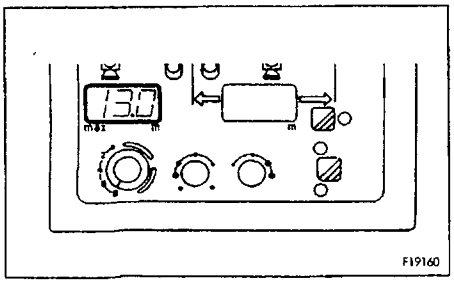


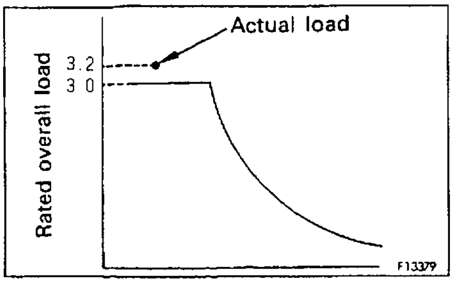
RATED WORKING RADIUS DISPLAY

⚠ WARNING

- **When carrying out operations with the auxiliary jib (in particular, when working with light loads), the display for the rated working radius may be unstable.**
  When carrying out operations with the auxiliary jib, use the angle as the base. Use the rated working radius only as a guide.
- **If a load is raised which exceeds the maximum rated overall load for that working mode, the rated working radius will be displayed as "0.0". For example, if a load of 3.2 tons is raised with the single top, the display will be "0.0" as shown in the diagram on the right.**

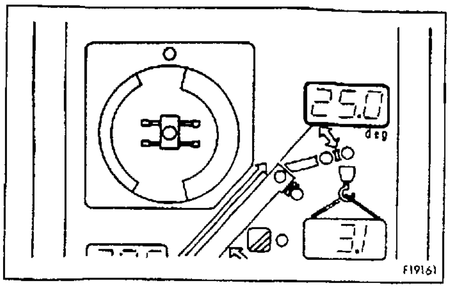
The rated working radius display shows the maximum radius to which the boom can be lowered with the present load. The displayed value includes the bending of the boom.





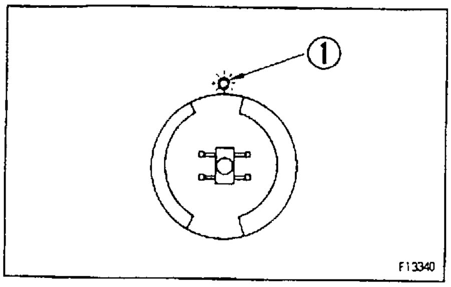
JIB ANGLE DISPLAY

This shows the angle of the jib during jib operations.



OVER-FRONT AREA DISPLAY LAMP

This lamp lights up when the upper structure is facing the front of the undercarriage. With on-tire operations, if the lamp is lighted up, the over-front functions are set, and if it is not lighted up, the 360° operation functions are set.

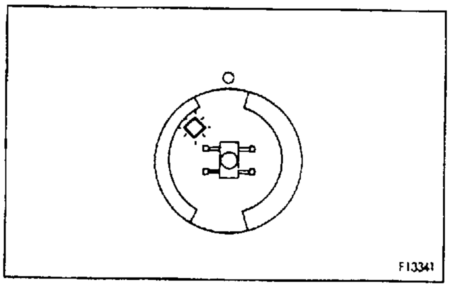


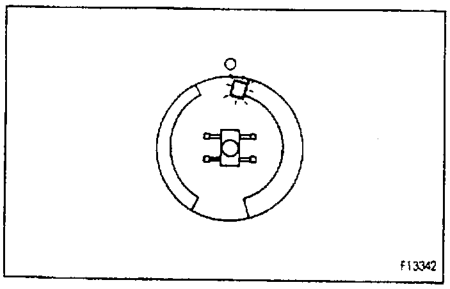
The over-front area is the area within a range of 1° each to the left and right.

The unit for the swing area display is 10°, which does not match the above range, so always follow the over-front area display lamp when carrying out on-tire operations.

SWING AREA DISPLAY

- The outrigger setting switch can be used to light up the danger area and check the condition. (Red lamp)
- If there is overload, the lamp that is ON and the lamp that is OFF are reversed, and the lamp flashes.
- For 360° operations, the display shows 36 units of 10° each. The swing position flashes to show the position.





When operations are being carried out within a range of 10° before the swing danger area (the position in the diagram on the right) and the upper structure is swung, the buzzer will sound intermittently.

The buzzer will sound when the structure is swung both to the left and to the right.

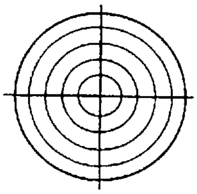
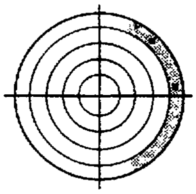
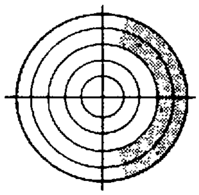
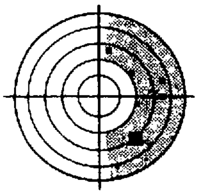
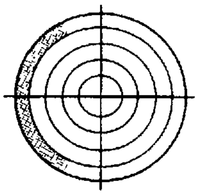
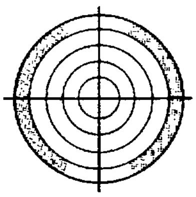
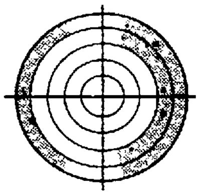
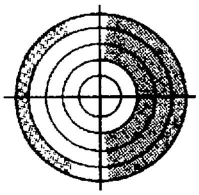
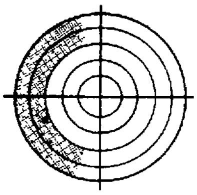
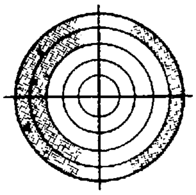
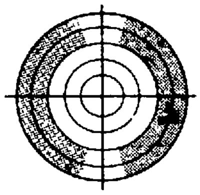
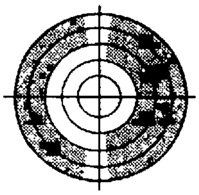
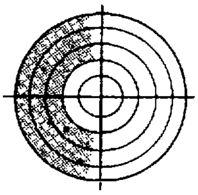
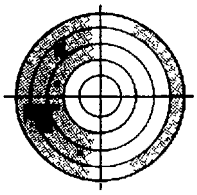
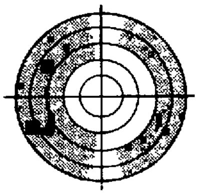
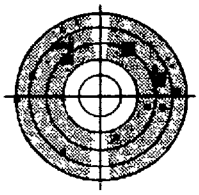
The closer the upper structure comes to the danger area, the faster the buzzer will sound. When the upper structure enters the danger area, there will be an overload condition, and the buzzer will sound continuously.

• SWING AREA DISPLAY ACCORDING TO OUTRIGGER SETTING SWITCH CONDITION

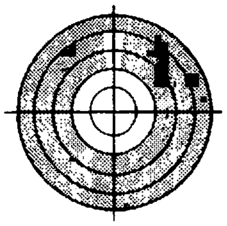
OPERATIONS WITH OUTRIGGER EXTENDED

▨ : Danger area

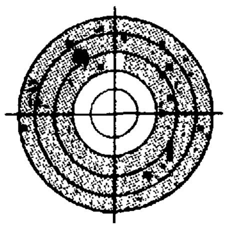
The items marked * are for machines with the H-shaped outriggers only.

Right Left	6.3 m (20.7 ft)	5.0 m (16.4 ft)	3.7 m (12.1 ft)	2.2 m* (7.2 ft)
6.3 m (20.7 ft)				
5.0 m (16.4 ft)				
3.7 m (12.1 ft)				
2.2 m* (7.2 ft)				

On-tire, stationary



On-tire, travel

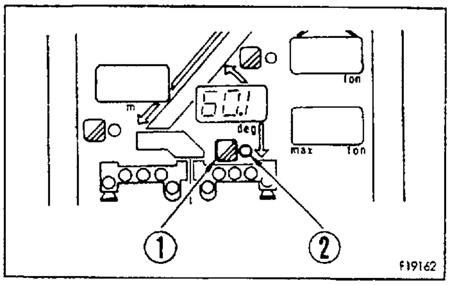


WORKING RANGE LIMIT WARNING

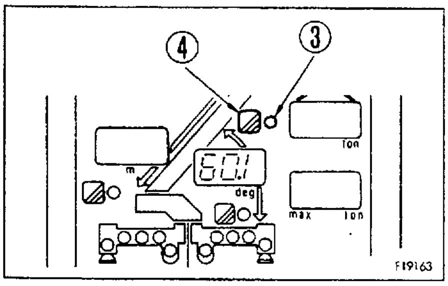
> **⚠ WARNING**
>
> **When the OSS power is turned OFF (PTO switch at TRAVEL, etc.), the settings become invalid, and the switches must be set again.**
> **The settings must be carried out again also if the working mode setting switches are changed during operations.**

If the working range for the boom is limited because of problems with the working site, the working range for the boom can be set to the desired range.
If the boom position is not in the position that has been set, the display lamp flashes and the buzzer sounds. However, be careful when operating, because the automatic stop does not function.

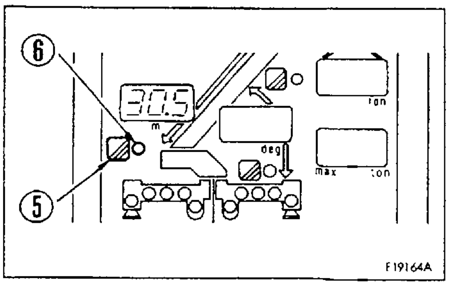
- **SETTING LOWER LIMIT FOR BOOM ANGLE**
  Set the boom to the desired angle, then press boom angle lower setting button ①. Boom angle lower limit display lamp ② will light up and the limit for the angle is set.
  To cancel the setting, press setting button ① once more.
  During operations, if the boom angle exceeds the angle that has been set, limit display lamp ② will flash and the buzzer will sound.



- **SETTING UPPER LIMIT FOR BOOM ANGLE**
  Set the boom to the desired angle, then press boom angle upper setting button ③. Boom angle upper limit display lamp ④ will light up and the limit for the angle is set.
  To cancel the setting, press setting button ③ once more.
  During operations, if the boom angle exceeds the angle that has been set, limit display lamp ④ will flash and the buzzer will sound.



- **SETTING LIMIT FOR LIFTING HEIGHT**
  Set the boom to the desired lifting height, then press lifting height setting button ⑤. Lifting height limit display lamp ⑥ will light up and the limit is set.
  To cancel the setting, press setting button ⑤ once more.
  During operations, if the boom is raised or extended, or the jib is raised, and the work equipment exceeds the lifting height that has been set, limit display lamp ⑥ will flash and the buzzer will sound.

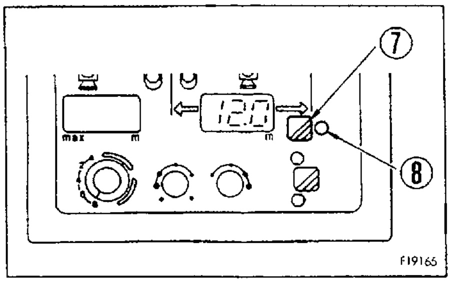


REMARK

The display for the boom length (height) display can be set for both the boom length and lifting height.

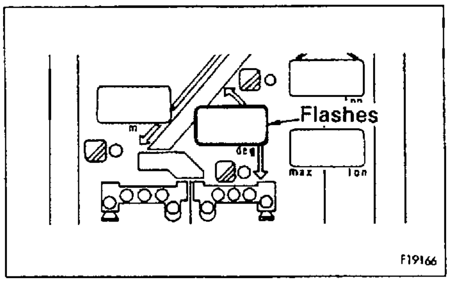
- **SETTING WORKING RADIUS**

  Set to the desired working radius, then press working radius setting button ⑦. Working radius limit display lamp ⑧ will light up and the limit is set.
  To cancel the setting, press setting button ⑦ once more.
  During operations, if the boom is lowered or extended, or the jib is lowered, and the work equipment exceeds the working radius that has been set, limit display lamp ⑧ will flash and the buzzer will sound.



BOOM ANGLE UPPER LIMIT WARNING

If the boom angle goes above than 82°, the buzzer will sound intermittently and the boom angle display will flash.



WARNING, ALARM OUTPUT DISPLAY

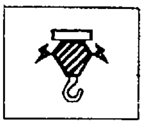
The table below shows the output for the working condition and the method of resetting.

It is possible that two separate displays in the mode in the table may be displayed at the same time.

○ : Buzzer sounds continuously, lamp lights up
△ : Buzzer sounds intermittently, lamp flashes

Buzzer		△	○	△
Front panel		–	–	△
OSS control panel	⚠	△	○	–
	Jib 1st, 2nd stage display lamp	–	–	–
	Boom angle upper limit display lamp	–	–	–
	Boom angle lower limit display lamp	–	–	–
	Working radius limit display lamp	–	–	–
	Lifting height limit display lamp	–	–	–
	Digital display	–	–	–
	Swing area display lamp	–	△	–
Condition of machine		When load ratio is between 90% and 100%	When load ratio is above 100%, the automatic stop is carried out. The WIND IN, boom LOWER and boom EXTEND operations cannot be carried out.	This is the overwinding condition. The WIND IN, boom LOWER and boom EXTEND operations cannot be carried out.
Action		Continue operations but operate carefully.	Lower the load, and set the machine to the proper working conditions. It is possible to cancel the automatic stop for the WIND OUT, boom LOWER, or boom RETRACT operations. However, never raise the boom when the load display is in the strong area.	Carry out the WIND OUT, boom LOWER, or boom RETRACT operations to cancel the automatic stop.

Buzzer		△	△	–
Front panel		–	–	–
OSS control panel	⚠	△	△	△
	Jib 1st, 2nd stage display lamp	–	–	△
	Boom angle upper limit display lamp	–	–	–
	Boom angle lower limit display lamp	–	–	–
	Working radius limit display lamp	–	–	–
	Lifting height limit display lamp	–	–	–
	Digital display	–	△ (Boom angle)	–
	Swing area display lamp	–	–	–
Condition of machine		The swing operation is being carried out within a range of 10° from the swing danger area.	The boom angle has exceeded 82°.	The mode selector switch on the side panel is at the jib mode position. The automatic stop is not actuated.
Action		When swinging to the safe side, the swing operation continues as it is. When swinging to the danger side, stop the swing slowly.	Lower the boom.	If the jib is not being extended or stowed away, turn the switch to the OFF position immediately.

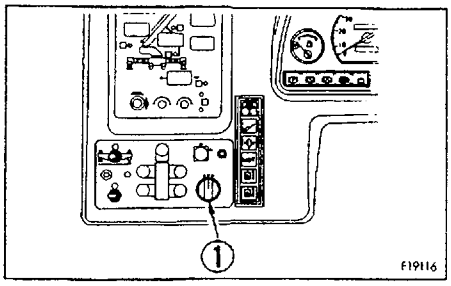
Buzzer		○	○	○
Front panel 		–	–	–
OSS control panel	⚠	△	△	△
	Jib 1st, 2nd stage display lamp	–	–	–
	Boom angle upper limit display lamp	△	–	–
	Boom angle lower limit display lamp	–	△	–
	Working radius limit display lamp	–	–	△
	Lifting height limit display lamp	–	–	–
	Digital display	–	–	–
	Swing area display lamp	–	–	–
Condition of machine		The boom angle has exceeded the set value for the upper limit. The automatic stop is not carried out.	The boom angle has exceeded the set value for the lower limit. The automatic stop is not carried out.	The work equipment has exceeded the set value for the working radiuss. The automatic stop is not carried out.
Action		Lower the boom or cancel the setting.	Raise the boom or cancel the setting.	Raise or retract the boom or cancel the setting.

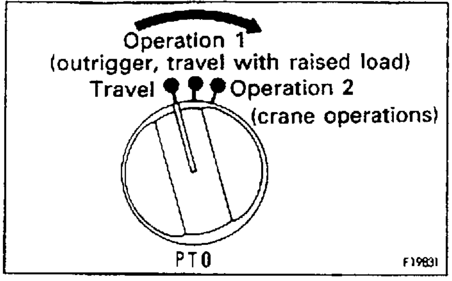
Buzzer		○	△	○
Front panel		–	–	–
OSS control panel	⚠	△	△	○
	Jib 1st, 2nd stage display lamp	–	–	–
	Boom angle upper limit display lamp	–	–	–
	Boom angle lower limit display lamp	–	–	–
	Working radius limit display lamp	△	–	–
	Lifting height limit display lamp	–	–	–
	Digital display	–	△ (Error code)	△ (Boom angle)
	Swing area display lamp	–	–	△
Condition of machine		The lifting height has exceeded the set value. The automatic stop is not carried out.	An error code is output and the automatic stop is carried out.	The boom angle has exceeded the upper limit for over-rear stability when carrying on-tire 360° operations. The automatic stop is carried out.
Action		Lower or retract the boom or cancel the setting.	Lower the load immediately and check the error code.	Lower the boom and cancel the automatic stop.

12.36.7 CHECK OSS

Check before starting operations

Before operating the crane, check the overload safety system as follows.





1. Start the engine. For details, see "12.2 STARTING ENGINE".
2. Set PTO switch ① to the "Operation 1" or "Operation 2" position. Turn the outrigger setting switch to the left and right to carry out the setting again.
3. Raise the boom to a position above horizontal.
4. To check the automatic stop function, set the outrigger setting switch to the CHECK position.
(Even when there is no load, a dummy signal sets to the automatic stop condition as a test.)
5. In the operation in Step 4, check that all the display lamps light up once within 1 second and that the buzzer sounds.
6. Operate the control levers and check the following items.

- Check that the boom does not extend even when the boom telescope lever is operated.
- Check that the winch does not wind in even when the winch control lever is operated.
- Check that the boom does not go down even when the boom hoist lever is operated.
- Check that the alarm buzzer sounds and the warning lamp is lighted up.

7. Return the outrigger setting switch from the CHECK position to the normal setting position.

8. Use the following procedure to check that the display values are normal.
    1) Check that the boom length display value is "9.5 ± 0.2 m (31.2 ± 0.7 ft)" when the boom length is at the minimum.
    2) Stow away the jib and single top, extend the outriggers fully, and set the machine horizontal.
    3) Set the working mode setting switch to BOOM.
    4) Set the outrigger setting switch to MAX EXTEND.(Set to match the actual extension width.)
    5) Extend the boom fully, and check that the boom length display value is 30.5 ± 0.5 m (100.0 ± 1.6 ft).
    6) Lower the boom and set the angle display gauge to 30 ± 0.1°.
    7) Wind in the main hook to just before the overwind position, and check that after 1 minute the moment display is the display value given in "23.3 CHECK BEFORE STARTING".
9. To check that the swing display is normal, carry out the swing operation and check that the position that flashes (the present position) on the swing area display matches the actual condition of the machine when swinging to both the left and right.

Carry out the checks with the jib and single top stowed away.

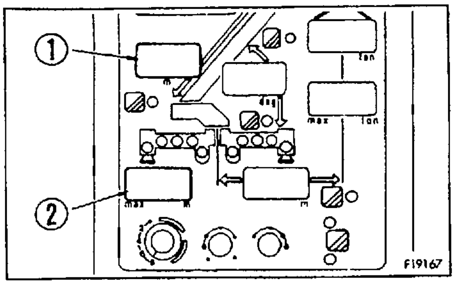
12.36.8 ERROR CODE DISPLAY AND METHOD OF CHECKING

If the self diagnostic function detects any abnormality, the ⚠ lamp on the OSS panel flashes, error code "Exx" is displayed, and the automatic stop is actuated.

If an error code is displayed, follow the method for checking the error code given in the table on the following pages to investigate the cause.

If the cause is unknown, contact your Komatsu distributor for inspection. When requesting inspection, always report the error code (the flashing number).

- If an error occurs, the error code is displayed on display ①.
- After an error occurs, even if the condition returns to normal, the error code is displayed on display ② for approx. 20 seconds after the condition returns to normal.



METHOD OF CHECKING ERROR CODE

Flashing value for error code	Probable cause	Method of checking
E 1 × Number between 11 and 13	Abnormality in electronic system inside OSS	Contact your Komatsu distributor for inspection.
E 2 × Number between 21 and 25	Abnormality in panel selector switch	There is probably an abnormality in the panel selector switch. • The switch may be stopped midway between two values, so set the selector switch again.
E 3 2	Mistake in combination of working mode selector switch and left and right outrigger setting switches	There is an error in the combination of the jib being used and the outrigger selector switch. • Carry out the setting correctly. For details, see the table at the end of this section.
E 3 8	Abnormality in boom lower limit condition or in pressure detection system	If this occurs at any position other than the boom lower limit, contact your Komatsu distributor for inspection.
E 4 0	Abnormality in electronic system inside OSS	Contact your Komatsu distributor for inspection.
E 4 1	Abnormality in boom angle detector system	There is probably an abnormality in the angle detector or the wiring system. • Carry out a visual check of the detector and the connections of the connectors and cables in the wiring line connected to the detector.
E 4 3	Abnormality in boom length detector system	There is probably an abnormality in the boom length detector or the wiring system. • Carry out a visual check of the detector and the connections of the connectors and cables in the wiring line connected to the detector.
E 4 4	Abnormality in pressure detector (bottom end) system	There is probably an abnormality in the detector or the wiring system. • Carry out a visual check of the detector and the connections of the connectors and cables in the wiring line connected to the detector.
E 4 5	Abnormality in pressure detector (head end) system	

Flashing value for error code	Probable cause	Method of checking
E 4 6	Abnormality in swing angle detector system	There is probably an abnormality in the swing angledetector or the wiring system. ● Carry out a visual check of the detector and the connections of the connectors and cables in the wiring line connected to the detector.
E 4 7	Abnormality in outrigger length detector system	There is probably an abnormality in the outrigger length detector or the wiring system. ● Carry out a visual check of the detector and the connections of the connectors and cables in the wiring line connected to the detector.
E 4 8	Abnormality in jib angle detector system	There is probably an abnormality in the jib angle detector or the wiring system. ● Carry out a visual check of the detector and the connections of the connectors and cables in the wiring line connected to the detector.
E 4 9	Abnormality in jib angle transmission system	There is probably an abnormality in the jib angle tramsmitter or the wiring system (including the jib transmission cord reel). ● Carry out a visual check of the transmitter and the connections of the connectors and cables in the wiring line connected to the transmitter.
E 5 × Number between 50 and 59 E 6 × Number between 60 and 61	Abnormality in electronic system inside OSS	Contact your Komatsu distributor for inspection.
E 7 × Number between 70 and 74	Abnormality in outrigger length transmission system	Contact your Komatsu distributor for inspection.
E 7 5	Abnormality in jib angle transmission system	Contact your Komatsu distributor for inspection.

IF E32 FLASHES

Select the switches in accordance with the table below.

Setting	Operating condition	Boom operations	Single top operations	Jib operations
Setting of OSS panel	Selector switch / Setting display	Boom lights up	Single top lights up	Set jib lights up
	Selector switch for no. of lengths of rope, jib	"8" "6" "4"	"SINGLE TOP"	"1ST STAGE" "2ND STAGE"
	Outrigger selector switch	"MAX" "Partial 5.0 m (16.4 ft)" "Partial 3.7 m (12.1 ft)" "MIN"	"MAX" "Partial 5.0 m (16.4 ft)" "Partial 3.7 m (12.1 ft)" "MIN"	"MAX" "Partial 5.0 m (16.4 ft)" "Partial 3.7 m (12.1 ft)" "MIN"
		ON-TIRE STATIONARY ON-TIRE TRAVEL (same combination on left and right)	ON-TIRE STATIONARY ON-TIRE TRAVEL (same combination on left and right)	

12.36.9 PRECAUTIONS WHEN USING

⚠ WARNING

- **If any mistake is made when setting the operating condition, the machine may turn over or be damaged, so always be sure to set the working mode setting switch and outrigger setting switches correctly, and check carefully before using the machine.**
- **Always operate the machine in accordance with the instructions in this Operation and Maintenance Manual.**
- **This system is set based on the standard condition for the machine, so the work equipment and other parts of the machine must not be modified.**

Do not touch any part other than the OSS control panel.

Always keep the OSS control panel clean, and wipe off any dirt or oil immediately with a soft clean cloth.

The OSS control panel is an electrical product that is installed inside the cab. Do not spray water directly on to it or leave it out in the rain.

Always use your fingertips when operating the push button switches on the OSS control panel.

Do not subject the OSS control panel or detectors (sensors) to any excessive shock. Do not leave them in any place in direct sunlight or where there is high temperature or humidity for any long period.

If the voltage of the power source drops below DC22V, the system may not work properly, so always carry out the periodic inspection of the battery carefully.

When setting the outrigger setting switches to on-tire operations to operate the crane, check that the tire inflation pressure is 784.5 kPa (8.0 kg/cm^2, 113.6 psi).

13. COLD WEATHER OPERATION

13.1 PRECAUTIONS FOR LOW TEMPERATURE

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

13.1.1 FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details of the specified viscosity, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

13.1.2 COOLANT

⚠ WARNING

Keep antifreeze fluid away from an open flame. Never smoke when using antifreeze.

NOTICE

- **Never use methanol, ethanol or propanol based antifreeze.**
- **Absolutely avoid using any water leak preventing agent irrespective of whether it is used independently or mixed with an antifreeze.**
- **Do not mix one antifreeze with a different brand.**

For details of the antifreeze mixture when changing the coolant, see "23.2 WHEN REQUIRED".

Use a Permanent Antifreeze (ethylene glycol mixed with corrosion inhibitor, antifoam agent, etc.) meeting the standard requirements as shown below. With permanent antifreeze, no change of coolant is required for a year. If it is doubtful that an available antifreeze meets the standard requirements, ask the supplier of that antifreeze for information.

Standard requirements for permanent antifreeze

- SAE J1034
- FEDERAL STANDARD O-A-548D

REMARK

Where no permanent antifreeze is available, an ethylene glycol antifreeze without corrosion inhibitor may be used only for the cold season. In this case, clean the cooling system twice a year (in spring and autumn). When refilling the cooling system, add antifreeze in autumn, but do not add any in spring.

13.1.3 BATTERY

⚠ WARNING

- **To avoid gas explosions, do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.**

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, and insulate it against cold temperature so that the machine can be started easily the next morning.

REMARK

Measure the specific gravity and calculate the rate of charge from the following conversion table.

Temp. of fluid / Rate of charge	20°C	0°C	-10°C	-20°C
100%	1.28	1.29	1.30	1.31
90%	1.26	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

13.2 PRECAUTIONS AFTER COMPLETION OF WORK

To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, always observe the following precautions.

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on hard, dry ground. If this is impossible, park the machine on wooden boards.
- Open the drain valve and drain the water accumulated in the air tank and fuel system to prevent the water from freezing.
- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.

13.3 AFTER COLD WEATHER

When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.
  For details, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with flash water.

14. LONG-TERM STORAGE

14.1 BEFORE STORAGE

When putting the machine in storage for a long time, do as follows.

- After every part is washed and dried, the machine shall be housed in a dry building. Never leave it outdoors.
  In case it is indispensable to leave it outdoors, park the machine on the well-drained concrete and cover it with canvas etc.
  Extend the outriggers and raise the tires off the ground.

- Carry out all operations for adding oil, greasing, and changing oil.

- Set the tire inflation pressure to approx. 80% of the standard pressure.

- Coat the piston rods of the hydraulic cylinders with grease.

- Disconnect the negative terminals of the battery and cover it, or remove it from the machine and store it separately.

- If the ambient temperature is expected to drop below 0°C, always add antifreeze to the cooling water.

14.2 DURING STORAGE

⚠ WARNING

If it is unavoidably necessary to carry out the rustpreventive operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

Operate the engine and move the machine for a short distance once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.

Before operating the work equipment, wipe off the grease from the hydraulic cylinder rods.

14.3 AFTER STORAGE

NOTICE

If the machine is stored without carrying out the monthly rust prevention operation, request your Komatsu distributor for service.

Carry out the following procedure when taking the machine out of long-term storage.

- Wipe off the grease from the hydraulic cylinder rods.
- Remove the drain plugs from the oil pan and each case, and drain out any water.
- Check for any rust on moving parts, and if any rust is found, clean, add oil, or adjust.

15. TROUBLESHOOTING

15.1 WHEN MACHINE RUNS OUT OF FUEL

When starting the engine after the machine has run out of fuel, add fuel, then fill the fuel filter cartridge with fuel and bleed the air from the fuel system before starting the engine.
For details of the method of bleeding the air, see "23.7 EVERY 500 HOURS SERVICE".

15.2 EMERGENCY TRAVEL OPERATION

Normal gear shifting operations are carried out by electric signals. If there is a failure in the electrical system, and the machine will not move even when the emergency gear shift switch is operated, do as follows, and it becomes possible to move the machine.

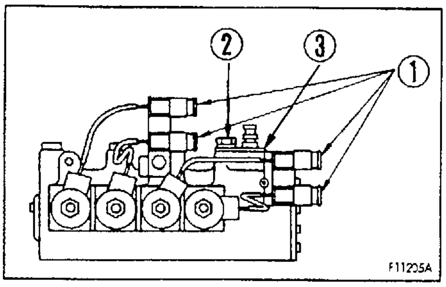
WARNING

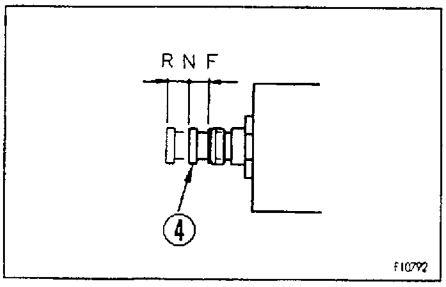
- **When carrying out this operation, always keep the engine stopped except when moving the machine.**
- **When the engine is started, the machine will move, so always keep the brake pedal fully depressed. Before starting the engine, check first that the area around the machine is safe.**
- **This system is only for use when the machine has to travel under its own power to a repair place when the electrical system has failed. Do not use this operation in any other case.**
- **Always set the gear shift lever to the neutral position.**
- **Install plate ③ securely. There is danger that the spool may come out when the machine is traveling.**

NOTICE

When carrying out the emergency travel operation, ask your Komatsu distributor to carry out the operation or carry out the operation according to your distributor's instructions.

1. Set the parking brake switch to the PARKING position and set the gear shift lever to the neutral position.
2. Start the engine, swing the revolving frame 90°, then stop the engine.
   When swinging the upper structure, be extremely careful of the main and auxiliary hooks.
3. Remove the cover on top of the transmission.
4. Disconnect connector ①.
5. Loosen bolt ②, then remove plate ③.
6. Pull out spool ④ to set it to the R position or push it in to the F position.
7. Install plate ③ and tighten bolt ②.
8. Depress the brake pedal, start the engine, swing the revolving frame to the travel position, then release the parking brake and let the brake pedal out slowly to move the machine.





NOTICE

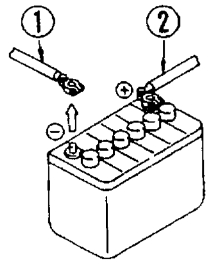
After driving the machine under its own power, always set the above parts back their original position.

15.3 IF BATTERY IS DISCHARGED

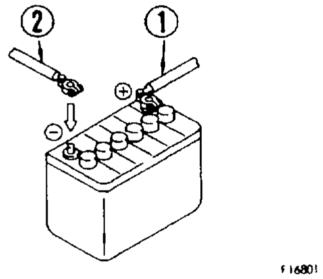
⚠ WARNING

- **When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position before starting.**
- **The battery generates hydrogen gas, so there is danger of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.**
- **Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.**
- **When handling the battery, always wear protective goggles.**
- **When removing the battery, first disconnect the cable from the ground (normally, from the negative ⊖ terminal). When installing, install the positive ⊕ terminal first. If a tool touches the cable connecting the positive terminal and the chassis, there is danger that it will cause sparks.**
- **If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion. When installing the terminals, install them tightly.**
- **When removing or installing, check which is the positive ⊕ terminal and negative ⊖ terminal.**

When removing, disconnect cable from ground first.



When installing, install cable to positive + terminal first



15.3.1 REMOVING, INSTALLING BATTERY WIRING

1. When removing the wiring, first disconnect the cable from the ground (normally the negative ⊖ terminal).
   If a tool touches the cable connecting the positive ⊕ terminal and the chassis, there is danger that it will cause sparks.
   Loosen the terminal nut, then remove wiring from the battery.

2. When installing the wiring, connect the cable to the ground last.
   Insert the terminal hole on the battery, then tighten the nuts.

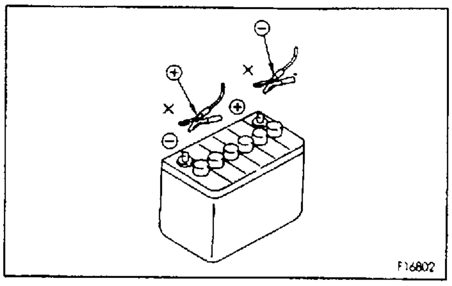
15.3.2 STARTING ENGINE WITH BOOSTER CABLE

When starting the engine with a booster cable, do as follows:

Precautions when connecting and disconnecting booster cable

⚠ WARNING

- **When connecting the cables, never contact the positive ⊕ and negative ⊖ terminals.**
- **When starting the engine with a booster cable, always wear safety glasses.**
- **Be careful not to let the normal machine and the problem machine touch.**
- **Be careful not to mistake the connections of the booster cables. Connect the cable to the engine block of the problem machine last. When doing this, sparks will be generated, so carry out the connection at a place as far as possible away from the battery.**



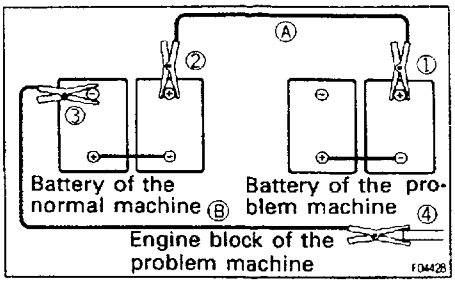
NOTICE

- **The size of the booster cable and clip should be suitable for the battery size.**
- **The battery of the normal machine must be the same capacity as that of the engine to be started.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**

Connecting the booster cables

Keep the starting switch at the OFF position.

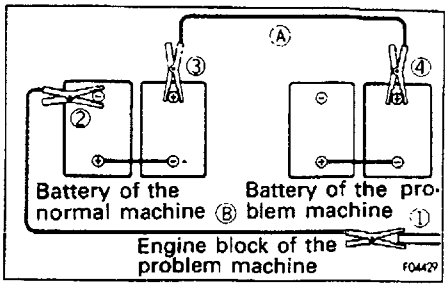
Connect the booster cable as follows, in the order of the numbers marked in the diagram.


Ⓐ
②
①
③
Battery of the normal machine
Ⓑ
Battery of the problem machine
④
Engine block of the problem machine
F04428

1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable Ⓐ to the positive ⊕ terminal of the problem machine.
3. Connect the other clip of booster cable Ⓐ to the positive ⊕ terminal of the normal machine.
4. Connect one clip of booster cable Ⓑ to the negative ⊖ terminal of the normal machine.
5. Connect the other clip of booster cable Ⓑ to the engine block of the problem machine.

Starting the engine

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the starting switch of the problem machine to the START position and start the engine. If the engine doesn't start at first, try again after 2 minutes or so.


Ⓐ
③
④
②
Battery of the normal machine
Ⓑ
Battery of the problem machine
①
Engine block of the problem machine
F04429

Disconnecting the booster cables

After the engine has started, disconnect the booster cables in the reverse of the order in which they were connected.

1. Remove one clip of booster cable Ⓑ from the engine block of the problem machine.
2. Remove the other clip of booster cable Ⓑ from the negative ⊖ terminal of the normal machine.
3. Remove one clip of booster cable Ⓐ from the positive ⊕ terminal of the normal machine.
4. Remove the other clip of booster cable Ⓐ from the positive ⊕ terminal of the problem machine.

15.4 OTHER TROUBLE

15.4.1 ELECTRICAL SYSTEM

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at hight speed	● Defective wiring ● Defective adjustment of fan belt tension	(● Check, repair loose terminals, disconnections) ● Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Lamp flickers while engine is running		
Charge monitor does not go out even when engine is running	● Defective alternator ● Defective wiring	(● Replace) (● Check, repair)
Abnormal noise is generated from alternator	● Defective alternator	(● Replace)
Starting motor does not turn when starting switch is turned to ON	● Defective wiring ● Insufficient battery charge	(● Check, repair) ● Charge
Pinion of starting motor keeps going in and out	● Insufficient battery charge	● Charge
Starting motor turns engine sluggishly	● Insufficient battery charge ● Defective starting motor	● Charge (● Replace)
Starting motor disengages before engine starts	● Defective wiring ● Insufficient battery charge	(● Check, repair) ● Charge

15.4.2 CHASSIS (TRAVEL PORTION)

- (   ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
TRANSMISSION		
Engine is running but machine does not move	● Gear shift lever is not shifted properly to position ● Defective wiring ● Circuit pressure does not rise ● Transmission pump worn, scuffing ● Oil leakage from oil line ● Insufficient oil in transmission case ● Clogged filter element, strainer in oil line ● Defective operation of control valve	● Shift gear shift lever properly (● Check, repair) ● See next item (● Check, replace) (● Check, repair) ● Add oil to specified level. See EVERY 50 HOURS SERVICE. ● Clean, replace (● Check, repair)
Even at full throttle, machine only moves slowly and lacks power	● Insufficient oil in transmission case ● Clogged filter element, strainer in oil line	● Add oil to specified level. See EVERY 50 HOURS SERVICE. (● Disassemble, clean)
Machine travels in some speed ranges, but does not travel in other speed ranges	● Defective wiring ● Defective gear shift controller (transmission control)	(● Check, repair) (● Replace)
Oil overheats	● Insufficient oil in transmission case ● Machine is not traveling in proper speed range ● Torque converter has been stalled for too long ● Radiator clogged with grass, mud	● Add oil to specified level. See EVERY 50 HOURS SERVICE. ● Travel in suitable speed range ● Reduce stall time ● Clean
Abnormal noise generated	● Insufficient oil in transmission case	● Add oil to specified level. See EVERY 50 HOURS SERVICE.

CHASSIS (TRAVEL PORTION) continued (15.4.2)

Problem	Main causes	Remedy
TORQUE CONVERTER		
Drive does not enter torque converter range	• Defective wiring • Defective operation of control solenoid valve	(• Check, repair) (• Check, replace)
AXLE		
Abnormal noise generated	• Lack of oil	• Add oil to specified level
WHEEL BRAKE		
Braking effect is poor when pedal is depressed	• Insufficient brake oil • Air in brake oil line • Air pressure does not rise (leakage of air from pipe)	• Add brake oil • Bleed air (• Check, repair)
Drakes pull to one side or drag	• Clogged breather in brake valve • Clogged breather in relay valve	• Clean • Clean
Brake slips	• Oil or grease stuck to brake lining	• Clean
PARKING BRAKE		
Braking effect is poor	• Defective adjustment of brake shoe • Deteriorated spring in brake chamber	(• Adjust) (• Check, replace)
STEERING		
Steering wheel is heavy	• Improper inflation of tires • Defective operation of priority valve	• Inflate to specified pressure (• Check, repair)
Steering wheel shakes	• Tighten steering wheel locknut	• Tighten

15.4.3 CHASSIS (WORK EQUIPMENT PORTION)

- (   ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
PUMP		
Work equipment does not move	● Blown fuse ● Defective switch ● Defective solenoid valve ● Defective wiring	● Replace (● Check, replace) (● Check, replace) (● Check, repair)
Abnormal noise generated	● Clogged strainer ● Loose mounting bolt ● Lack of oil	● Check, clean ● Check, tighten ● Check, add oil
OUTRIGGERS		
Outriggers do not move	● Blown fuse ● Defective switch ● Defective solenoid valve ● Defective wiring	● Check, replace (● Check, replace) (● Check, replace) (● Check, repair)
Outriggers move sluggishly	● Drop in set pressure of relief valve	(● Check, adjust)
Jack cylinder retracts during operations	● Defective double pilot check valve	(● Check, replace)
Jack cylinders extend when machine is traveling	● Defective double pilot check valve	(● Check, replace)
SWING		
Brakes do not work	● Air in oil line ● Defective master cylinder	● Bleed air (● Check, repair)
Upper structure does not swing, swings sluggishly	● Drop in set pressure of relief valve ● Brake still applied ● Defective solenoid valve	(● Check, adjust) (● Check, repair) (● Check, replace)

CHASSIS (WORK EQUIPMENT PORTION) continued (15.4.3)

Problem	Main causes	Remedy
BOOM HOIST		
Cylinder does not extend	● Drop in set pressure of relief valve ● Outrigger solenoid has not returned to neutral	(● Check, adjust) (● Check, replace)
Cylinder does not retract	● Defective counterbalance valve ● Outrigger solenoid has not returned to neutral	(● Check, repair) (● Check, replace)
Cylinder retracts because of hydraulic drift during operations	● Defective counterbalance valve	(● Check, repair)
BOOM TELESCOPE		
Boom does not retract	● Defective counterbalance valve ● Outrigger solenoid has not returned to neutral	(● Check, repair) (● Check, replace)
Boom does not extend	● Drop in set pressure of relief valve ● Outrigger solenoid has not returned to neutral	(● Check, adjust) (● Check, replace)
Boom goes down because of hydraulic drift during operations	● Defective counterbalance valve	(● Check, repair)
WINCH		
Winch does not wind in	● Drop in set pressure of relief valve ● Winch clutch slipping ● Leakage of oil from winch clutch circuit ● Scuffing of brake cylinder lever ● Defective shuttle valve ● Outrigger solenoid has not returned to neutral	(● Check, adjust) (● Check, adjust) (● Check, repair) (● Check, repair) (● Check, repair) (● Check, replace)
Winch does not wind out	● Defective counterbalance valve ● Defective shuttle valve ● Leakage of oil from accumulator circuit ● Scuffing of brake cylinder lever ● Outrigger solenoid has not returned to neutral	(● Check, repair) (● Check, repair) (● Check, repair) (● Check, repair) (● Check, replace)
Free-fall operation cannot be carried out	● Scuffing of brake cylinder lever ● Leakage of oil from accumulator circuit ● Seizure of drum shaft bearing	(● Check, repair) (● Check, repair) (● Replace, add grease)

CHASSIS (WORK EQUIPMENT PORTION) continued (15.4.3)

Problem	Main causes	Remedy
Brakes do not work	• Defective adjustment of band • Oil, water stuck to brake • Scuffing of brake cylinder lever	(• Adjust) (• Clean) (• Check, repair, add grease)
OVERLOAD SAFETY SYSTEM (OSS)		
No power when switch is turned on	• Blown fuse	• Replace
Digital display on panel face flashes	• Use self-diagnostic function to judge	• See table in SETTING OVERLOAD SAFETY SYSTEM
No command given in display on control box	• Disconnection or defective wiring in display system • Defective board for display panel circuit	(• Check, repair) (• Replace)
When carrying out CHECK BEFORE STARTING command value on display does not match correct value	• Defective detector • Defective calculation portion of control box • Wrong setting button pressed	(• Check, repair) (• Check, repair) • Set again
Warning, alarm buzzer does not sound	• Disconnection or defective buzzer system • Defective electronic circuit in control box	(• Check or replace buzzer) (• Check, repair)
Does not carry out automatic stop	• Defective solenoid valve	(• Check, repair)

15.4.4 ENGINE

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure caution lamp lights up	● Engine oil pan oil level is low (sucking in air) ● Clogged oil filter element ● Defective wiring	● Add oil to specified level. See CHECK BEFORE STARTING. ● Replace. See EVERY 250 HOURS SERVICE (● Check, repair)
Steam is emitted from top part of radiator (pressure valve)	● Cooling water level low, water leakage ● Loose fan belt ● Dirt or scale accumulated in cooling system ● Clogged radiator fin or damaged fin	● Add cooling water, repair. See CHECK BEFORE STARTING ● Adjust fan belt tension. See EVERY 250 HOURS SERVICE ● Change cooling water, clean inside of cooling system. See WHEN REQUIRED ● Clean or repair. See WHEN REQUIRED
Indicator of water temperature gauge is in red range	● Defective thermostat ● Loose radiator filler cap (high-altitude operation) ● Defective water temperature gauge	(● Replace thermostat) ● Tighten cap or replace packing (● Replace water temperature gauge)
Indicator of water temperature gauge is in white range on left side	● Defective thermostat ● Defective water temperature gauge	(● Replace thermostat) (● Replace water temperature gauge)
Engine does not start when starting motor is turned	● Lack of fuel ● Air in fuel system ● Defective fuel injection pump or nozzle ● Starting motor cranks engine sluggishly ● Defective valve clearance ● Defective operation of electric motor for fuel cut	● Add fuel. See CHECK BEFORE STARTING ● Repair place where air is sucked in (● Replace pump or nozzle) } See ELECTRICAL SYSTEM (Contact your Komatsu distributor for inspection)
Exhaust gas is white or blue	● Too much oil in oil pan ● Improper fuel	● Add oil to specified level. See CHECK BEFORE STARTING ● Change to specified fuel

ENGINE continued (15.4.4)

Problem	Main causes	Remedy
Exhaust gas turns black	• Clogged air cleaner element • Defective nozzle • Defective compression • Defective turbocharger	• Clean or replace. See WHEN REQUIRED (• Replace nozzle) • Adjust valve clearance. See above (• Check or replace turbocharger)
Combustion noise occasionally makes breathing sound	• Defective nozzle • Defective fuel injection pump	(• Replace nozzle) (• Replace pump)
Abnormal noise generated (combustion or mechanical)	• Low grade fuel being used • Overheating • Damage inside muffler • Excessive valve clearance	• Change to specified fuel • See "Indicator of water temperature gauge is in red range." • Replace muffler (Contact your Komatsu distributor for inspection)
Engine speed does not rise when accelerator pedal is depressed	• Defective operation of accelerator valve • Defective operation of air cylinder • Scuffing of lever linkage	(• Check, replace) (• Check, replace) (• Check, repair)

MAINTENANCE

16. GUIDES TO MAINTENANCE

Do not carry out any inspection and maintenance operation that is not given in this manual. Perform maintenance work on hard, flat ground.

Check service meter:
Check the service meter reading every day to see if the time has come for any necessary maintenance to be carried out.

Komatsu genuine replacement parts:
Use Komatsu genuine parts specified in the Parts Book as replacement parts.

Komatsu genuine oils:
Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

Always use clean washer fluid:
Use automobile window washer fluid and be careful not to let any dirt get into it.

Always use clean oil and grease:
Use clean oil and grease. Also, keep containers of the oil and grease clean. Keep foreign materials away from oil and grease.

Keeping the machine clean:
Always keep the machine clean. This makes is easier to find parts causing problems. Keep in particular grease fittings, breathers and oil level gauges clean and avoid foreign matters from getting in them.

Be careful of hot water and oil:
Draining hot oils and coolants and removing their filters immediately after the engine stops are hazardous. Allow the engine to cool.
If the oil has to be drained when it is cold, warm up the oil to a suitable temperature (approx. 20 – 40°C) before draining it.

Checking foreign materials in drained oil and on filter:
After oil is changed or filters are replaced, check the oil and filters for metallic particles and foreign materials. If large quantities of metallic particles or foreign materials are found, consult your Komatsu distributor.

Fuel strainer:
If your machine is equipped with a fuel strainer, do not remove it while fueling.

Oil change:
Check or change oils in the places where dust is scarce to keep foreign materials away from oils.

Warning tag:
Attach the warning tag to the starting switch or other appropriate control lever to avoid someone who is not aware of the circumstances from starting the engine.

Obey precautions:
During the operation, always obey the precautions on the safety label attached to the machine.

Welding instructions:

- Turn off the engine starting switch.
- Do not apply more than 200 V continuously.
- Connect grounding the cable within 1 m from the area to be welded.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

Fire prevention:
Use nonflammable cleaner or light oil for cleaning parts. Keep flame or cigarette light away from light oil.

Clamp faces:
When O-rings or gaskets are removed, clean the clamp faces and replace the O-rings and gaskets with new ones. Be sure to fit O-rings and gaskets when assembling.

Objects in your pockets:
Keep your pockets free of loose objects which can fall out and drop into the machinery; especially when you work on the machinery while bending over it.

Checking undercarriage:
When working in rocky areas, check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nuts. Loosen the track tension a little when working in such areas.

Precautions when washing machine:

- Never spray steam or water directly on the connectors and mechatronics parts.
- Do not allow water to get on the monitors and controllers inside the operator's cab.
- Never spray steam or water directly at the radiator or oil cooler portions.

Pre-and post-work checks:
Before starting work in mud, rain, snow or at seashore, check plugs and valves for tightness.
Wash the machine immediately after the work to protect components from rusting.
Lubricate components more frequently than usual. Be sure to lubricate work equipment pins daily if they are submerged in water.

Dusty worksites:
When working at dusty worksites, do as follows:

- Inspect the air cleaner clogging monitor to see whether the air cleaner is blocked up. Clean the air cleaner at shorter intervals than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.

Avoid mixing oils:
Never mix oils of different brands. If you have only oil which is a different brand from the one that is used in the machine, do not add it but replace all the oil.

17. OUTLINES OF SERVICE

- Use Komatsu genuine parts for replacement.
- When changing or adding oil, do not use a different type of oil.
- Unless otherwise specified, the oil and coolant used at the time of shipment from the factory are as shown in the table below.

Item	Kind of fluid
Engine oil pan	SAE 15W-40 API classification CD
Swing machinery case Winch gear case Final drive case Differential case	SAE 90 API classification CD
Transmission case	SAE 30 API classification CD
Hydraulic tank	Idemitsu Daphni Super Hydraulic Fluid 32
Fuel tank	ASTM D975 No. 2 (However, ASTM D975 No. 1 is used for the winter season) (October to March)
Radiator	Komatsu Supper Coolant (AF-ACL) 30% added to water

17.1 OUTLINE OF OIL, FUEL, COOLANT

17.1.1 OIL

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and it deteriorates with use.
  Always use oil that matches the grade and temperature for use given in the Operation and Maintenenance Manual. Even if the oil is not dirty, always replace the oil after the specified interval.

- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.
  The majority of problems with machine are caused by the entry of such impurities.
  Take particular care not to let any impurities get in when storing or adding oil.

- Never mix oils of different grades or brands.

- Always add the specified amount of oil.
  Having too much oil or too little oil are both causes of problems.

- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.

- When changing the oil, always replace the related filters at the same time.

- We recommend you to have an analysis made of the oil periodically to check the condition of the machine. For those who wish to use this service, please contact your Komatsu distributor.

17.1.2 FUEL

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
  Fuel may congeal depending on the temperature when it is used (particularly in low temperature below-15°C), so it is necessary to change to a fuel that matches the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

17.1.3 COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
  Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped.
  This anti-freeze is effective in preventing corrosion of the cooling system.
  The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze is inflammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing proportions, see 23.2.4 CLEAN INSIDE OF COOLING SYSTEM.
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

17.1.4 GREASE

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they do not need grease.
  If any part becomes stiff after being used for long time, add grease.
- Always wipe off all of the old grease that is pushed out when greasing. Be particularly careful to wipe off the old grease in places. Where sand or dirt sticking in the grease would cause wear of the rotating parts.

17.1.5 STORING OIL AND FUEL

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drum can is at the side. (To prevent moisture from being sucked in)
  If drum cans have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

17.1.6 FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.
  Replace all filters periodically. For details, see the Operation and Maintenance Manual.
  However, when working in severe conditions, it is necessary to consider replacing the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are stuck to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

17.2 OUTLINE OF ELECTRIC SYSTEM

- If the wiring gets wet or the insulation is damaged, the electric system leaks and this could result in hazardous malfunction of the machine.
- Services relating to the electric system are check of fan blet tension, check of damage or wear in the fan belt and check of battery fluid level.
- Never remove or disassemble any electric components installed in the machine.
- Never install any electric components other than these specified by Komatsu.
- Be careful to keep the electric system free of water when washing the machine or when it rains.
- When working on the seashore, carefully clean the electric system to prevent corrosion.
- The optional power source must never be connected to the fuse, starting switch, or battery relay.

18. WEAR PARTS LIST

Wear parts such as the filter element are to be replaced at the time of periodic maintenance.
The wear parts should be changed correctly in order to use the machine economically.
When replacing parts, Komatsu genuine parts of excellent quality should be used.
When ordering parts, please check the part number in the parts book.

WEAR PARTS LIST ( ): Replace these parts at the same time

Item	Part No.	Part Name	Q'ty	Replacement interval
Engine oil filter	600-211-1230	Cartridge	1	Every 250 hours
Fuel filter	600-311-8291	Cartridge	1	Every 500 hours
Transmission case oil filter	424-16-11140 (424-16-11130)	Cartridge (O-ring)	1 (1)	Every 500 hours
Hydraulic filter	07063-01210 (07000-05185)	Element (O-ring)	1 (1)	Every 500 hours
Air cleaner	600-181-3300	Element assembly	1	–
Wire rope	23S-75-21111 23S-75-21120	Wire rope 170 m, Wire rope 95 m	1 1	–
Electrical intake air heater	6150-11-4820	Gasket	2	–
Grease cartridge	23S-47-25110	Grease reservoir	1	–

19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE	CAPACITY	
		-22 -4 14 32 50 68 86 104°F -30 -20 -10 0 10 20 30 40°C	Specified	Refill
Engine oil pan	Engine oil	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40	32 ℓ 8.45 US gal 7.04 UK gal	26 ℓ 6.86 US gal 5.72 UK gal
Transmission case		SAE 30 SAE 10W	25 ℓ 6.6 US gal 5.5 UK gal	25 ℓ 6.6 US gal 5.5 UK gal
Final drive case (each)	Gear oil	SAE 90	10 ℓ 2.64 US gal 2.2 UK gal	10 ℓ 2.64 US gal 2.2 UK gal
Winch gear case			3.5 ℓ 0.92 US gal 0.77 UK gal	3.5 ℓ 0.92 US gal 0.77 UK gal
Differential gear case (each)			22 ℓ 5.81 US gal 4.84 UK gal	22 ℓ 5.81 US gal 4.84 UK gal
Swing machinery case			1.7 ℓ 0.45 US gal 0.37 UK gal	1.6 ℓ 0.42 US gal 0.35 UK gal
Hydraulic system (Note 1)	Hydraulic oil	Idemitsu Daphni Super Hydraulic Fluid 32	500 ℓ 132 US gal 110 UK gal	400 ℓ 105.6 US gal 88 UK gal
(Note 2)		Idemitsu Daphni Super Hydraulic Fluid 22WR	When changing the oil, please contact your Komatsu distributor	
(Note 3)	Brake fluid	FMVSS DOT4 (Glycol type)		
Fuel tank	Diesel fuel	ASTM D975 No.2 ※	300 ℓ 79.2 US gal 66 UK gal	–
Cooling system	Water	Add antifreeze	38 ℓ 10.03 US gal 8.36 UK gal	-

※ ASTM D975 No. 1

For the hydraulic oil and brake oil, we recommend the following products if they are available.
Note 1: Shell Tellus 32, Esso Teresso 32
Note 2: Shell Tellus T22
Note 3: Shell brake fluid DOT4 (Glycol type)

REMARK

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.
  Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engin oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

- When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though an atmospheric temperature goes up to 10°C more or less in the day time.

- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.

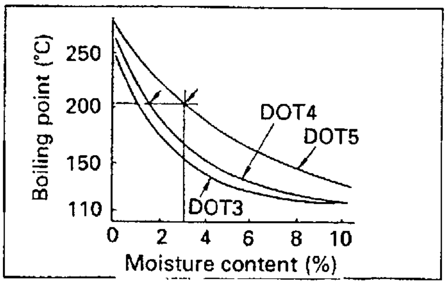
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil that matches the temperature in the table.

- We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.
Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material
SAE: Society of Automotive Engineers
API: American Petroleum Institute

- Travel brake fluid for rough terrain crane
  If the standard brake fluid DOT5* is not available, DOT4 can be used in its place.
  However, if DOT4 is used, keep strictly to the following precautions.



1. Brake fluid maintenance
   The boiling point of DOT5 and DOT4 differs as shown in the diagram on the right.
   Taking a water absorption ratio of 3% as the normal, we recommend changing the fluid every 1000 hours (approx. 1 year). However, if DOT4 is used, change the fluid every 500 hours (approx. 6 months).
2. Types of brake fluid
   Always use a glycol type fluid for DOT4. The system is filled with DOT5 when the machine is shipped from the factory, but if DOT4 is added later, the performance will be the equivalent of DOT4.
3. Precautions when traveling
   Stick a warning notice inside the cab.
   Shift down to a gear range that matches the grade of the slope, and use the braking effect of the engine. If the machine still travels too fast, use the exhaust brake, and reduce the load on the foot brake as much as possible. If the foot brake is used too often, the brake will overheat and cause a dangerous situation.
   * DOT5 refers to FMVSS DOT5.1, and it is a glycol base brake fluid.

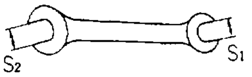
No.	Supplier	**Engine Oil** **[CD or CE]** SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	**Gear Oil** **[GL-4 or GL-5]** SAE80, 90, 140	**Grease** **[Lithium-Base]** NLGI No. 2	**Anti-freeze Coolant** **[Ethylene Glycol Base]** **Permanent Type**
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT (Winter, one season type)
2	AGIP	Diesel sigma S Super dieselmulti-grade *Sigma turbo	Rotra MP	GR MU/EP	–
3	AMOCO	*Amoco 300	Multi-purpose gear oil	RYKON premium grease	–
4	ARCO	*Arcofleet S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	–
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	–
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	–
10	ELF	Multiperformance 3C Performance 3C	–	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifreeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	–

No.	Supplier	**Engine Oil** **[CD or CE]** SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	**Gear Oil** **[GL-4 or GL-5]** SAE80, 90, 140	**Grease** **[Lithium-Base]** NLGI No. 2	**Anti-freeze Coolant** **[Ethylene Glycol Base]** **Permanent Type**
14	PENNZOIL	*Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White – bearing grease	Anti-freeze and summer coolant
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimula X	Spirax EP Spirax heavy duty	Alvania EP grease	–
17	SUN	-	Sunoco GL5 gear oil	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco antifreeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Code 2055 startex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total transmission TM	Multis EP2	Antigel/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	-
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	-	Antifreeze

20. STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

20.1 INTRODUCTION OF NECESSARY TOOLS

The following tools are provided with the machine.

No.	Name of tool	Part No.	Remarks
1	Wrench set	09000-30006	Applicable width across flats (S_1-S_2) 8mm - 10mm, 12mm - 14mm 13mm - 17mm, 19mm - 22mm 24mm - 27mm, 30mm - 32mm 
2	Socket wrench set	09020-10282	
3	Screwdriver	09033-00190	Interchangeable flat-head and cross-head type
4	Pliers	09036-00150	
5	Hammer	09039-00150	
6	Wrench	09002-03641	Jaw size: 36 mm - 41 mm
7	Socket	09084-03853	
8	Gauge	09289-00000	For tire inflation pressure
9	Filter wrench	09019-08035	
10	Funnel	09279-00000	
11	Tube	07270-00690	For bleeding air
12	Grease pump	07952-80002	For lithium base grease
13	Grease pump	07952-40000	For molybdenum disulphide grease
14	Nozzle	07951-11400	For grease pump
15	Cartridge	07950-90403	Lithium grease
16	Wrench	09007-00528	Hexagonal wrench
17	Gauge	23S-98-21310	Brake pad wear gauge

If any of the above tools are broken, please order replacements from your Komatsu distributor.

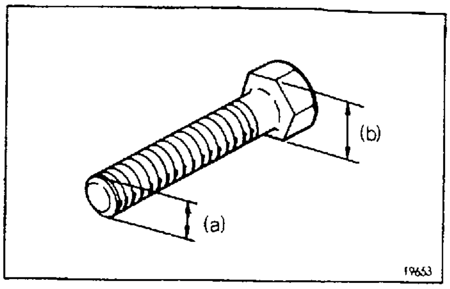
20.2 TORQUE LIST

Unless otherwise specified, tighten the metric bolts and nuts to the torque shown in the table.

The tightening torque is determined by the width across the flats ⓑ of the nut and bolt.

If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Nm (newton meter): 1Nm ≒ 0.1 kgm
≒ 0.74 lbft



Thread diameter of bolt (mm) (a)	Width across flat (mm) (b)	Ⓣ Ⓗ		
		Nm	kgm	lbft
6	10	13.2 ± 1.4	1.35 ± 0.15	9.73 ± 1.03
8	13	31.4 ± 2.9	3.2 ± 0.3	23.2 ± 2.1
10	17	65.7 ± 6.8	6.7 ± 0.7	48.5 ± 5.0
12	19	112 ± 9.8	11.5 ± 1.0	82.6 ± 7.2
14	22	177 ± 19	18.0 ± 2.0	131 ± 14
16	24	279 ± 29	28.5 ± 3	206 ± 21
18	27	383 ± 39	39 ± 3	282 ± 29
20	30	549 ± 58	56 ± 6	405 ± 43
22	32	745 ± 78	76 ± 8	549 ± 58
24	36	927 ± 98	94.5 ± 10	684 ± 72
27	41	1320 ± 140	135 ± 15	973 ± 100
30	46	1720 ± 190	175 ± 20	1270 ± 140
33	50	2210 ± 240	225 ± 25	1630 ± 180
36	55	2750 ± 290	280 ± 30	2030 ± 210
39	60	3280 ± 340	335 ± 35	2420 ± 250

NOTICE

When tightening panels or other parts having tightening fixtures made of plastic, be careful not to use excessive fightening torque: doing so will damage the plastic parts.

21. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always carry out periodic maintenance. In addition, to further improve safety, the user should also carry out periodic replacement of the parts given in the table. These parts are particularly closely connected to safety and fire prevention.

With these parts, the material changes as time passed, or they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses.

When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.

Ask your Komatsu distributor to replace the safety critical parts.

CRITICAL PARTS

No.	Parts for periodic replacement	Replacement interval	Remark
1	Brake hose (air and oil line)	Every 1 year	–
2	Rubber parts for dual brake valve	Every 1 year	Replace with repair kit
3	Rubber parts for brake booster	Every 1 year	Replace with repair kit
4	Rubber parts for disc brake, caliper cylinder	Every 1 year	Replace with repair kit
5	Packing, seal, O-ring for steering cylinder	Every 2 years	–
6	Rubber hose for steering cylinder	Every 2 years	–
7	Fuel hose	Every 2 years	–
8	Brake fluid	Every 1 year	–

22. MAINTENANCE SCHEDULE CHART

22.1 MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
INITIAL 250 HOURS SERVICE	
Replace fuel filter cartridge	3-74
Replace hydraulic filter element	3-77
Clean air filter	3-78
Change oil in swing machinery case	3-79
Change oil in transmission case, clean strainer	3-83
Change oil in final drive gear case (4 places)	3-84
Change oil in differential gear case (2 places)	3-87
Check engine valve clearance, adjust	3-88
WHEN REQUIRED	
Greasing	3-25
● Boom foot pin (1 place)	3-25
● Rear steering lock pin (1 place)	3-25
● Hoist cylinder bottom pin (1 place)	3-26
● Transmission mount trunnion (1 place)	3-26
● Outrigger beam (4 places)	3-26
● Steering column shaft (1 place)	3-26
Check oil level in differential gear case, add oil	3-27
Check oil level in final drive case, add oil	3-28
Clean inside of cooling system	3-29
Check air cleaner, clean, replace	3-33
Clean radiator fins, check	3-35
Clean breather	3-36
● Transfer case breather	3-36
● Differential gear case breather	3-36
Clean hydraulic tank cap element	3-36
Check electrical intake air heater	3-37
Check air tank safety valve	3-37
Check window washer tank, add fluid	3-37
Adjust winch brake	3-38
Adjust winch clutch	3-41

SERVICE ITEM	PAGE
CHECK BEFORE STARTING	
Greasing	3-42
● Guide sheave (2 places)	3-42
● Bottom centralized greasing (1 place)	3-42
Check coolant level, add water	3-43
Check fuel level	3-44
Check oil level in engine oil pan, add oil	3-45
Check oil level in hydraulic tank, add oil	3-46
Check travel brake fluid level, add fluid	3-47
Check play of steering wheel	3-48
Check tire inflation pressure	3-48
Drain water from air tank	3-49
Check dust indicator	3-49
Drain water from air filter	3-49
Check swing brake fluid level, add fluid	3-50
Check winch brake fluid level, add fluid	3-50
Check braking effect	3-50
Check rise in air pressure, check exhaust noise from brake valve	3-50
Check flashing of lamps, check for dirt, damage	3-50
Check direction of backup mirror, check for dirt or damage	3-50
Check reflectors and number plate for dirt or damage	3-51
Check operation of horn	3-51
Check engine exhaust color and sound	3-51
Check operation of gauges	3-51
Check that abnormalities from previous day have been repaired	3-51
Check braking effect of parking brake	3-51
Check door lock	3-51
Check operation of wipers, window washer, check washer fluid level	3-51
Check operation of steering mechanism	3-51
Check wire rope	3-51
Check outrigger check valve	3-51
Check operation of OSS electronic panel	3-51
Check operation of work equipment	3-52

SERVICE ITEM	PAGE
CHECK BEFORE STARTING (continued)	
Check hook	3-52
Check braking effect of swing brake	3-52
Check OSS	3-52
Check accumulator pressure	3-53
Check function of safety devices (overwind prevention system)	3-54
Check braking effect of winch brake	3-54
Check effect of winch clutch	3-54
Check electric wiring	3-54
Check jib winch rope	3-54
Check for water and sediment in water separator, drain water	3-54
EVERY 50 HOURS SERVICE	
Greasing	3-55
• 2nd, 3rd, top boom bottom face (3 places)	3-55
• Boom slide pad (6 places)	3-55
• Hoist cylinder rod pin (1 place)	3-55
• Swing pinion (1 place)	3-56
• Swing circle (4 places)	3-56
Check oil level in transmission case, add oil	3-56
Drain water, sediment from fuel tank	3-57
EVERY 100 HOURS SERVICE	
Greasing	3-58
• Wire rope (2 places)	3-58
• Main hook (1 place)	3-58
• Auxiliary hook (2 places)	3-58
• 1st boom front sheave (4 places)	3-59
EVERY 250 HOURS SERVICE	
Greasing	3-60
• Drive shaft (8 places)	3-60
• Axle joint (6 places)	3-61
• Outrigger float [H-shaped outrigger] (4 places)	3-61
• Outrigger jack cylinder trunnion pin [X-shaped outrigger] (8 places)	3-61
• Outrigger support lever pin [X-shaped outrigger] (8 places)	3-61

SERVICE ITEM	PAGE
EVERY 250 HOURS SERVICE (continued)	
● Outrigger jack cylinder rod pin [X-shaped outrigger] (4 places)	3-62
● Outrigger jack lever support pin [X-shaped outrigger] (4 places)	3-62
● Outrigger float [X-shaped outrigger] (4 places)	3-62
Check battery fluid level	3-62
Change oil in engine oil pan, replace engine oil filter cartridge	3-63
Check fan belt tension, adjust	3-65
Check oil level in lubricator, add oil	3-66
Check braking effect of parking brake, adjust	3-67
Check operation of emergency steering system	3-68
Check braking effect of winch brake, adjust	3-68
Check effect of winch clutch, adjust	3-69
Check for loose swing circle mounting bolts, tighten	3-70
Check for loose wheel hub bolts, nuts, tighten	3-71
Check leaf spring, tighten	3-71
Check drive shaft	3-72
Check for damage to any structure	3-72
Check for wear of disc brake pad	3-73
EVERY 500 HOURS SERVICE	
Replace fuel filter cartridge	3-74
Replace transmission oil filter cartridge	3-76
Check air governor	3-76
Replace hydraulic filter element	3-77
Clean air filter	3-78
Check brake alarm system	3-78
Change travel brake fluid	3-78
EVERY 1000 HOURS SERVICE	
Change oil in swing machinery case	3-79
Check function of winch drum	3-80
Clean fuel tank strainer	3-80
Change swing brake fluid	3-81
Change winch brake fluid	3-81
Check play of turbocharger rotor	3-81

SERVICE ITEM	PAGE
EVERY 1000 HOURS SERVICE (continued)	
Check tightening portions of turbocharger	3-81
Replace corrosion resistor cartridge	3-81
EVERY 2000 HOURS SERVICE	
Change oil in winch reduction gear case	3-82
Change oil in transmission case, torque converter case, clean strainer	3-83
Change oil in final drive gear case (4 places)	3-84
Clean engine breather element	3-85
Change oil in hydraulic tank	3-86
Change oil in differential gear case (2 places)	3-87
Clean turbocharger, check	3-88
Check alternator, starting motor	3-88
Check engine valve clearance, adjust	3-88
Check vibration damper	3-88
Replace air dryer desiccant (for machines equipped with air dryer)	3-88
EVERY 4000 HOURS SERVICE	
Check water pump	3-89
Check air compressor, adjust	3-89

23. SERVICE PROCEDURE

23.1 INITIAL 250 HOURS SERVICE

Carry out the following maintenance after operating a new machine for the first 250 hours.

- **REPLACE FUEL FILTER CARTRIDGE**
- **REPLACE HYDRAULIC FILTER ELEMENT**
- **CLEAN AIR FILTER**
- **CHANGE OIL IN SWING MACHINERY CASE**
- **CHANGE OIL IN TRANSMISSION CASE, CLEAN STRAINER**
- **CHANGE OIL IN FINAL DRIVE GEAR CASE**
- **CHANGE OIL IN DIFFERENTIAL GEAR CASE**
- **CHECK ENGINE VALVE CLEARANCE, ADJUST**

For details of the method of replacing or maintaining, see the section on EVERY 500 HOURS, 1000 HOURS, and 2000 HOURS SERVICE.

23.2 WHEN REQUIRED

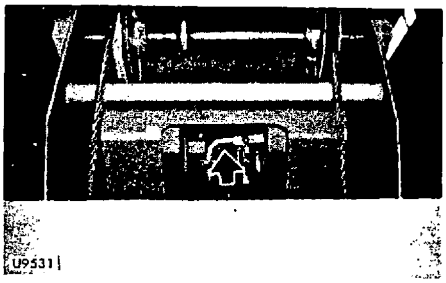
23.2.1 GREASING

1. Using a grease pump, pump in grease through the grease fitting marked by the arrow.

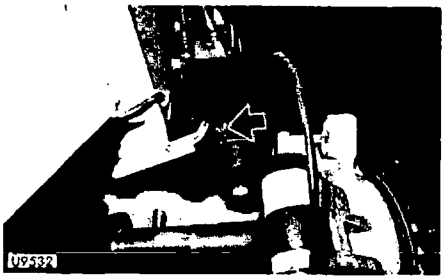
2. After greasing, wipe off any old grease that is pushed out.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

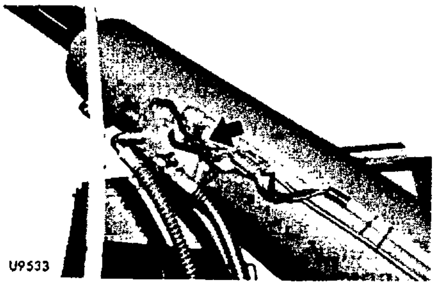
1. Boom foot pin (1 place)



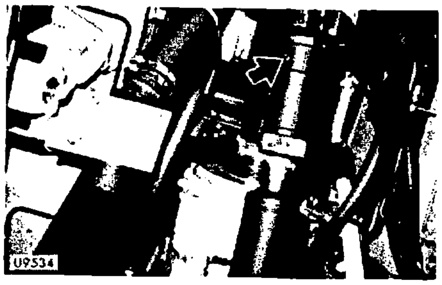
2. Rear steering lock pin (1 place)



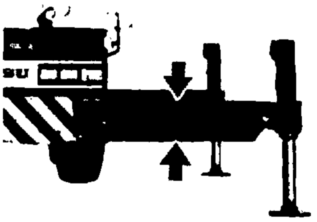
3. Hoist cylinder bottom pin (1 place)



4. Transmission mount trunnion (1 place)

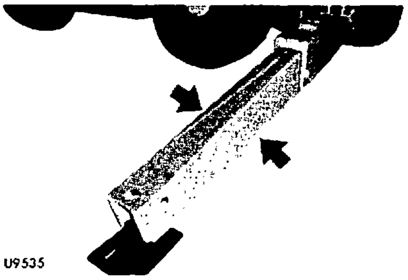


5. Outrigger beam (4 places)
   [H-shaped outrigger]

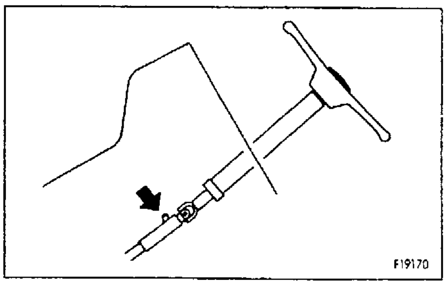


[X-shaped outrigger]

If the outrigger does not move smoothly, coat the top and bottom sliding surface of the outrigger inner beam with grease. Be particularly careful that the grease is fully coated to the surfaces in the interior.



6. Steering column shaft (1 place)



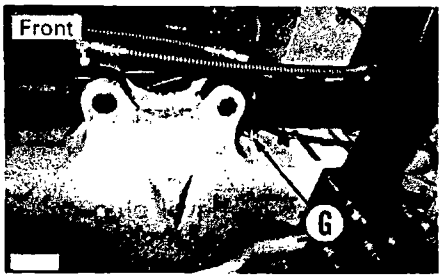
23.2.2 CHECK OIL LEVEL IN DIFFERENTIAL GEAR CASE, ADD OIL

⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

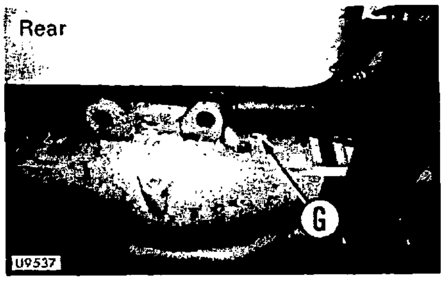
Carry out this check if oil stains can be seen on the differential gear case.

1. Remove level plug ⓖ and check that the oil level is near the bottom of the plug hole.



2. If the oil level is low, add gear oil through the plug hole until it overflows.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

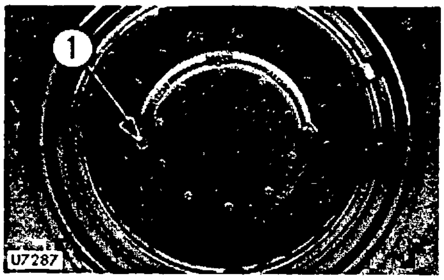


23.2.3 CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

Carry out this check if oil stains can be seen on the final drive case.



1. Stop the machine so that the TOP casting mark on the final drive case is at the top.
2. Remove the level plug and check that the oil level is near the bottom of plug hole ①.
3. If the oil level is low, add gear oil through plug hole ① until it overflows.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

23.2.4 CLEAN INSIDE OF COOLING SYSTEM

WARNING

- **Soon after the engine has been stopped, the coolant is hot and can cause personal injury. Allow the engine to cool before draining water.**
- **Since cleaning is performed while the engine is running, it is very dangerous to enter the rear side of the machine as the machine may suddenly start moving. While the engine is running, never enter the rear side of the machine.**
- **Never remove the radiator cap when the engine is at operating temperature. At operating temperature, the coolant is under pressure. Steam blowing up from the radiator could cause personal injury. Allow the engine to cool until the radiator filler cap is cool enough to touch with your hand. Remove the filler cap slowly to allow pressure to be relieved.**

- Clean the inside of the cooling system change the coolant and replace the corrosion resistor according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Replacing corrosion resistor
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant.
Non permanent type antifreeze containing ethylene glycol (Winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or every 1000 hours whichever comes first	

- Stop the machine on level ground when cleaning or changing the coolant.
- Use a permanent type of antifreeze.
  If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.

- When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.
  It is actually better to estimate a temperature about 10°C lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	−10	−15	−20	−25
	°F	14	5	−4	−13
Amount of antifreeze	ℓ	11.4	13.7	15.6	17.5
	US gal	3.01	3.62	4.12	4.62
	UK gal	2.51	3.01	3.42	3.90
Amount of water	ℓ	26.6	24.3	22.4	20.5
	US gal	7.02	6.41	5.91	5.41
	UK gal	5.85	5.35	4.94	4.46

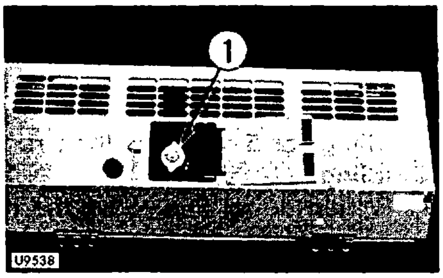
⚠WARNING

Antifreeze is flammable, so keep it away from any flame.

- Use city water for the cooling water.
  If river water, well water or other such water supply must be used, contact your Komatsu distributor.
- We recommend use of an antifreeze density gauge to control the mixing proportions.

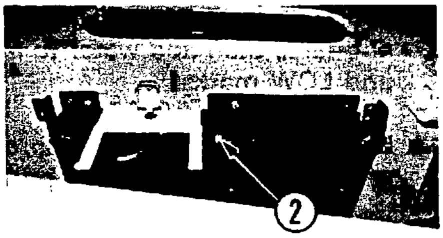
⚠WARNING

When removing drain plug, avoid pouring coolant on yourself.



U9538

1. Turn radiator cap ① slowly to remove it.
2. Set a container to catch the mixture of water and coolant. Open drain valve ② at the bottom of the radiator and drain plug ③ on the side face of the cylinder block to drain the coolant.



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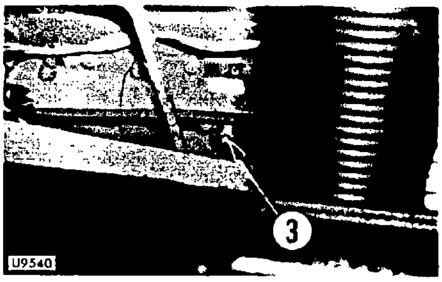


U9540

3. After draining the coolant, close drain valve ② and drain plug ③, then fill with fresh water (city water).
4. When the radiator is full, open drain valve ② and drain plug ③, then start the engine and run it at low idling.
   Keep the engine running at low idling and flush the system for 10 minutes.
   Adjust the flow of water filling the radiator and draining from the radiator so that the radiator is always full during the flushing operation. Be careful that the filler hose does not come out of the radiator water filler during the flushing operation.
5. After the flushing operation, stop the engine, drain the water from drain valve ② and drain plug ③, then close them.
6. After draining the water, use a flushing agent and flush the system.
   For details of flushing the system, see the directions on the flushing agent.
7. After flushing, open drain valve ② and drain plug ③, drain all the water out of the system, then close them and fill with fresh water (city water) up to near the water filler port.
8. When the radiator is full, open drain valve ② and drain plug ③, then start the engine, run at low idling, and continue until clean water comes out.

Adjust the flow of water filling the radiator and draining from the radiator so that the radiator is always full during the flushing operation.

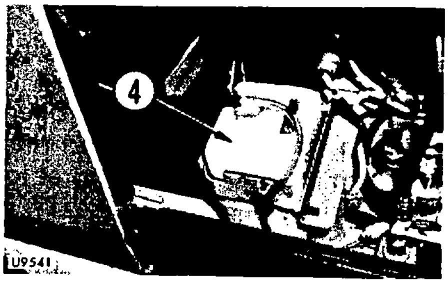
9. When clean water comes out, stop the engine, and close drain valve ② and drain plug ③.

10. Add fresh water (city water) to the radiator until the water overflows from the water filler.

11. To remove any air in the cooling water, run the engine at low idling for 5 minutes, then run it for another 5 minutes at high idling.
(When doing this, leave the radiator cap off.)

12. Drain the cooling water inside sub-tank ④, flush the inside of the sub-tank, then add water to a point midway between the FULL and LOW marks.

13. Stop the engine, wait for approx. 3 minutes, then add fresh water up to near the water filler port. After filling the radiator, tighten the cap.



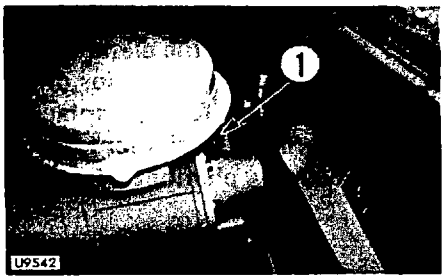
23.2.5 CHECK AIR CLEANER, CLEAN, REPLACE

⚠ WARNING

- **Never clean or replace the air cleaner while the engine is running.**
- **When using compressed air to clean the element, there is danger that dust will fly and get into your eyes, so always wear protective glasses.**

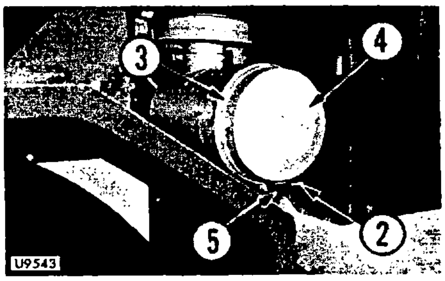
Checking

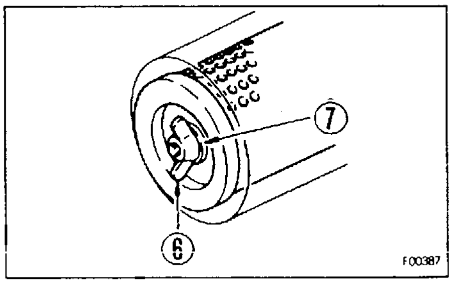
If dust indicator ① shows red, clean the air cleaner element.



Cleaning or replacing element

1. Loosen bolt ②, remove band ③ and cover ④, then remove the wing nut and take out the element.
2. Clean the inside of the body and the cover.
3. Clean and check the element.
4. After cleaning the element, install it again.
5. Press the button of dust indicator ① to return the red piston to its original position.



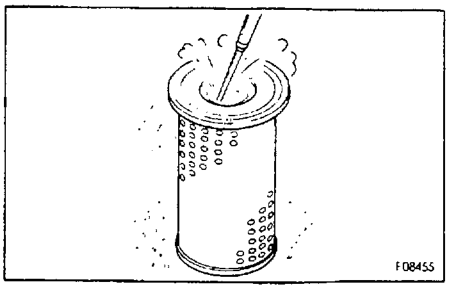


When checking and cleaning the air cleaner, remove vacuator valve ⑤, and blow with compressed air to clean.
Replace any element which has been cleaned 6 times or used for one year.
Replace the element if the dust indicator shows red immediately after the element is cleaned even if the element has not been cleaned 6 times.
If seal washer ⑦ is damaged or the thread of wing nut ⑥ is damaged, replace with new parts.
Never clean or replace the air cleaner while the engine is running.

Method of cleaning element

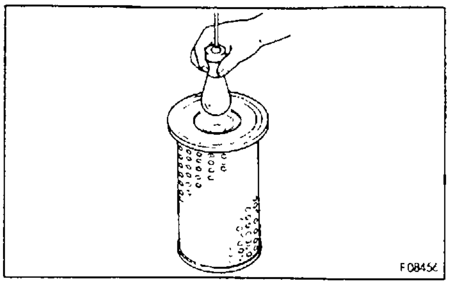
- When using compressed air

Direct dry compressed air (below 700 kPa (7 kg/cm^2, 100 psi)) from inside of the element along its folds. Then blow with air along the folds from the outside, and finally blow again from the inside.



NOTICE

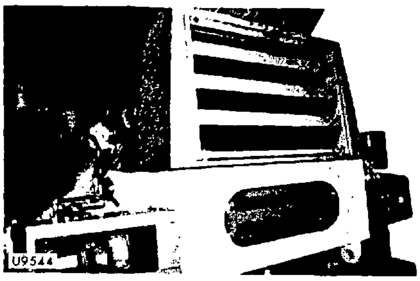
After cleaning the element, shine an electric bulb from the inside and check if any small holes or thin parts are found on the element. If such parts are found, replace the element.
When cleaning the element, do not hit it or beat it against anything.
Do not use any element whose folds or gasket or seal are damaged.



23.2.6 CLEAN RADIATOR FINS, CHECK

WARNING

Do not let compressed air, steam, or water hit directly against your body. There is danger of injury. Always wear protective glasses, mask, and safety boots.



1. Remove the upper and lower radiator grills.
2. Use compressed air to blow off the mud, dirt, or leaves clogging the radiator fins.
   Steam or water may be used instead of compressed air.
3. Check the rubber hoses and if any hoses are found to be cracked or deteriorated, replace them. Check also for loose hose clamps, and tighten them.

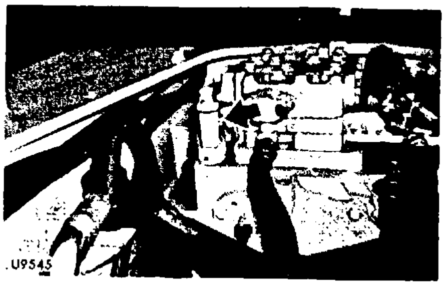
NOTICE

When using compressed air, stand at a distance from the radiator to prevent damage to the fins. If the fins are damaged, this will cause water leakage and overheating.

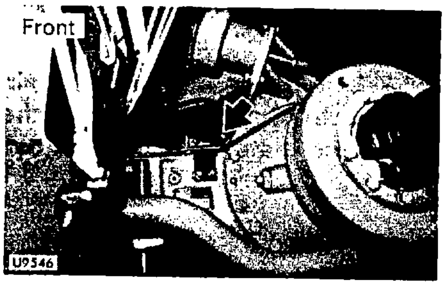
23.2.7 CLEAN BREATHER

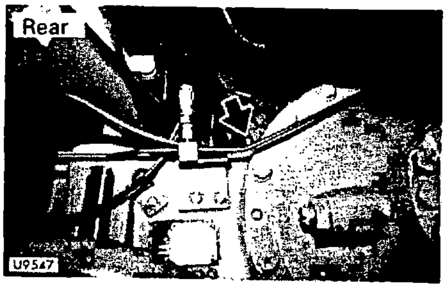
Remove the breather and rinse it in clean diesel oil to remove the dirt.

1. Transfer case breather



2. Differential gear case breather



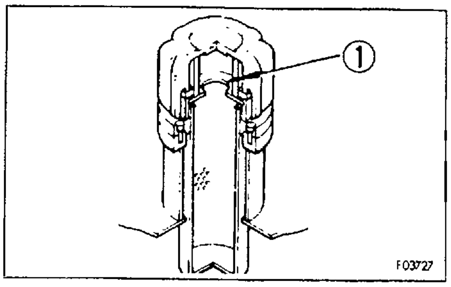


23.2.8 CLEAN HYDRAULIC TANK CAP ELEMENT

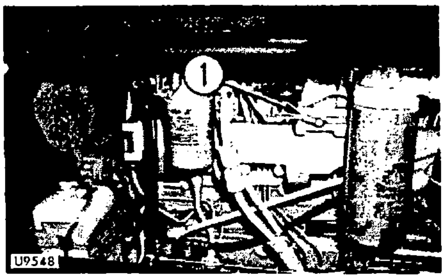
⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

When taking off the oil filler cap, turn it slowly to release the internal pressure before removing it.

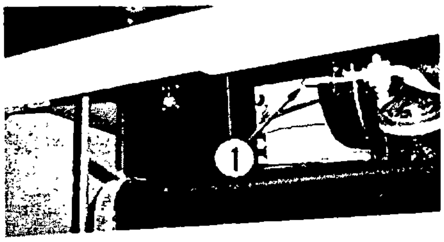


Carry out this operation if mud or dirt are stuck around the breather.
Remove the cap, then remove plate ①, take out the element, and clean it.
Replace the element if it is excessively dirty.



23.2.9 CHECK ELECTRICAL INTAKE AIR HEATER

Check the heater once a year before the cold season starts. Remove electrical intake air heater ① from the engine intake manifold, and check for disconnections or dirt.
When checking and installing the electrical intake air heater, replace the gasket with a new part.



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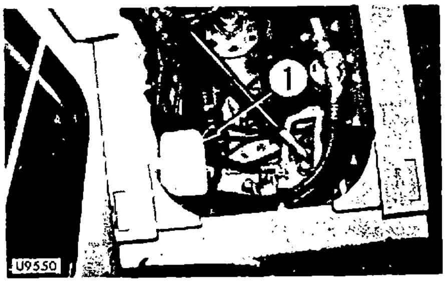
23.2.10 CHECK AIR TANK SAFETY VALVE

Pull release pin ① by hand to check that there is no problem in operation caused by clogging with dirt.
The pin should move lightly and air should blow out.

Set pressure: 930 ± 40 kPa (9.5 ± 0.4 kg/cm^2, 135 ± 6 psi)



23.2.11 CHECK WINDOW WASHER TANK, ADD FLUID

Carry out this check if air comes out in the washer fluid or if no fluid comes out at all when the washer switch is pressed.

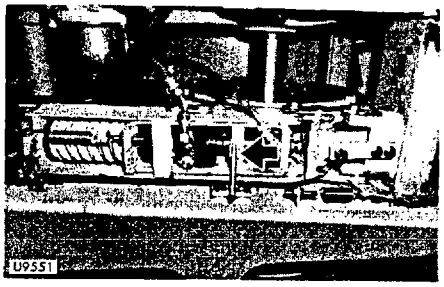
If no washer fluid comes out when the washer switch is pressed, check washer tank ① and add window washer fluid if necessary.

NOTICE

To prevent clogging of the nozzle, do not use soapy water as the window washer fluid.

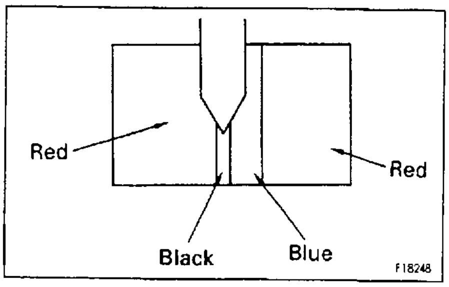
23.2.12 ADJUST WINCH BRAKE

If the brake lining is worn or the clearance between the lining and the drum is not correct, there will be loss of braking force and it may be impossible to carry out free- fall operations smoothly.
Adjust the winch brake as follows.



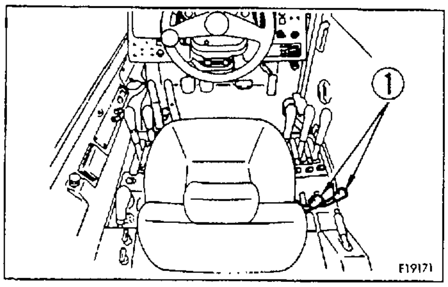
Checking

If the winch brake indicator is in the red range, adjust the winch brake.

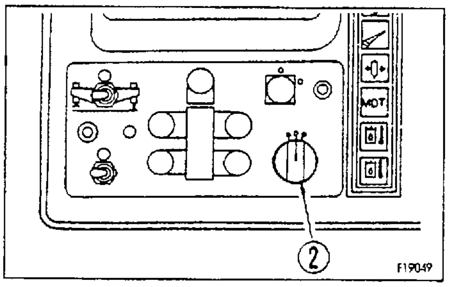


Adjusting

1. Lay the hook on the ground, then lock the drum with the drum lock lever.
2. Set clutch levers ① to the OFF position.

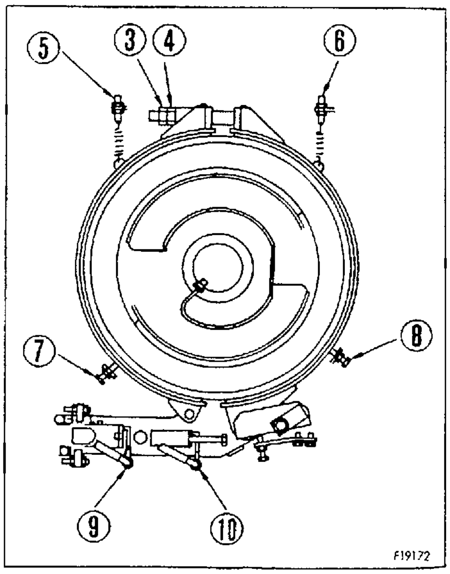


3. Start the engine and set PTO switch ② to the "Operation 2" position.
4. Loosen locknut ③, then turn adjustment nut ④ to adjust so that the indicator enters the black range.
   One turn of the adjustment nut moves the indicator by 2.5 mm (0.1 in).



5. Set clutch levers ① to the ON position and check that the indicator is in the black range.
   If it is not in the black range, adjust again.
6. Turn locknut ③ to lock the adjustment nut in position.

Tightening torque: 550 ± 60 Nm (56 ± 6 kgm, 400 ± 40 lbft)

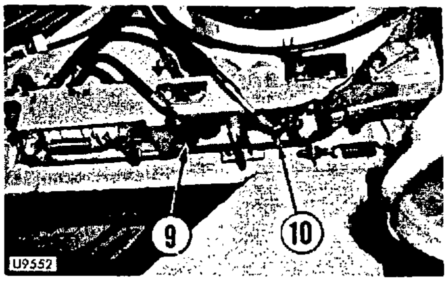


7. After setting clutch levers ① to the OFF position, adjust with adjustment bolts ⑤, ⑥, ⑦, and ⑧ so that the clearance between the brake band and the drum is uniform.

8. Set the drum lock lever to the FREE position, then check the braking effect of the winch brake for the main winch and auxiliary winch brakes.

9. If the brake drags, bleed the air from the brake cancel cylinder as follows.
   Carry out the same procedure for both the main winch and auxiliary winch.

   (1) Set the clutch levers to the ON position, remove the cap from air bleed plug ⑨, then insert a vinyl tube and put the other end in a glass container holding hydraulic oil.
   (2) Paying attention to the position of the hook, use the winch control lever to wind out the hook.
   (3) Loosen air bleed plug ⑨ and bleed the air from inside the cancel cylinder.
   (4) When no more bubbles come out, tighten air bleed plug ⑨, fit the cap, then return the winch control levers to the neutral position.

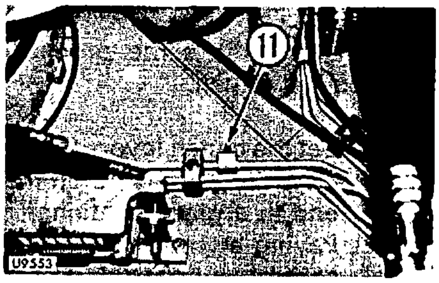


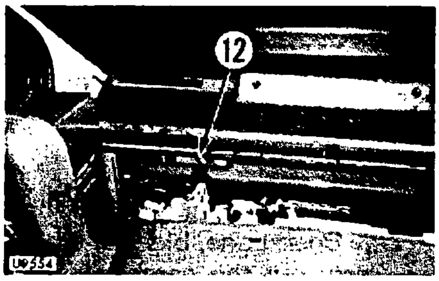
10. If the load cannot be held by the winch brake pedal during free-fall operations, bleed the air from the brake cylinder as follows.
    Carry out the same procedure for both the main winch and auxiliary winch.

    (1) Lay the hook on the ground, then lock the drum with the drum lock lever.
    (2) Set the clutch levers to the OFF position, remove the cap from air bleed plug ⑩, then insert a vinyl tube and put the other end in a glass container holding hydraulic oil.
    (3) Depress the winch brake pedal, and loosen air bleed plug ⑩.
    (4) After bleeding the air, tighten air bleed plug ⑩, then release the winch brake pedal.
    Be careful not to let air get in when tightening the plug.

(5) Repeat Steps (3) and (4) to bleed the air completely.
(6) After bleeding the air completely, tighten the air bleed plug, return the clutch levers to the ON position and set the drum lock lever to the FREE position.

11. Use the same procedure to bleed the air from air bleed plugs ⑪ (2 places) and ⑫ (1 place) in the piping forthe brake cancel air cylinder and brake air cylinder.

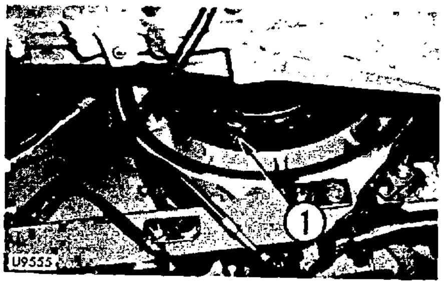




23.2.13 ADJUST WINCH CLUTCH

1. Wind the main hook out and lay it on the ground. Take care that the wire rope winds out neatly.
2. Lock the drum with the drum lock lever to prevent the drum from turning.
3. Release the lock for the main winch clutch lever and set it to the OFF position.

Adjusting



1. Turn adjustment nut ① of the clutch wheel cylinder fully in the direction to expand the shoe.
2. From this condition, turn the adjustment nut back 4 clicks in the direction for contracting the shoe.
   This will give a clearance between the shoe and drum of approx. 0.26 mm (0.01 in).
3. Adjust the two wheel cylinders in the same way.

Checking

1. Set the main winch clutch lever to the ON position.
2. Set the main winch lever to the WIND IN position and check that there is no slipping between the drum and clutch shoe.
3. Carry out the free-fall operation and check that the hook lowers freely.

REMARK

Use the same procedure to adjust the auxiliary winch clutch.

23.3 CHECK BEFORE STARTING

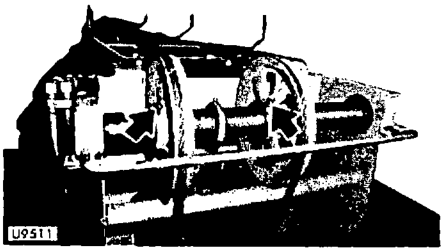
The items in this section are carried out once only before starting the engine for the first time each day.

23.3.1 GREASING

1. Using a grease pump, add grease through the grease fittings marked by arrows.
2. After greasing, wipe off any old grease that is forced out.

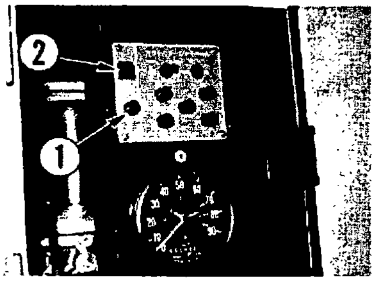
For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

1. Guide sheave (2 places)
   Slide so that the whole shaft of the guide sheave is coated with grease.



2. Bottom centralized greasing point (1 place)

- Tie rod pin
- King pin
- Steering cylinder pin
- Suspension cylinder pin
- Suspension spring hanger
- Suspension spring pin



(1) Push greasing switch ① at the side of the outrigger control panel on the left side of the machine.

(2) Lamp ② above switch ① lights up to indicate that greasing is completed, but keep switch ① pressed for a further 2 – 3 seconds.

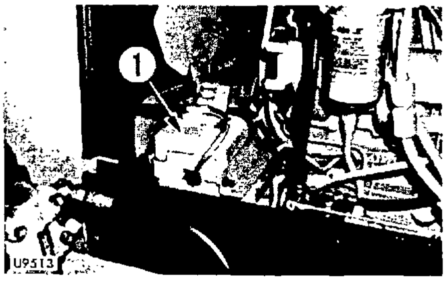
REMARK

- Check that there is grease in the grease cartridge before pushing the greasing switch.
- Always use the special cartridge for the grease.
- If the grease cartridge becomes empty, air will enter the piping. Replace the cartridge before this happens.

23.3.2 CHECK COOLANT LEVEL, ADD WATER

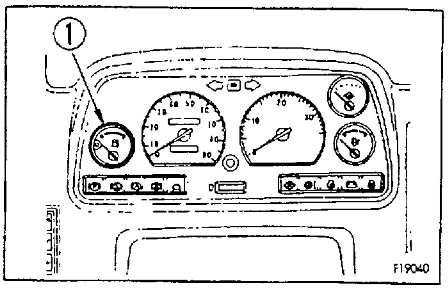
⚠ WARNING

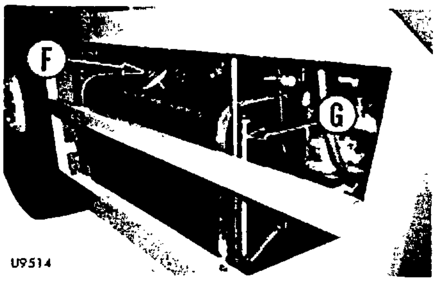
Normally, do not open the radiator cap. When checking the coolant, always wait for the engine to cool down, and check the sub-tank.



1. Open the engine side cover at the right side of the machine, and check that the coolant is between the FULL and LOW marks on sub-tank ①. If the level is low, add water to the FULL level through the water filler of sub-tank ①.
2. After adding water, tighten the cap securely.
3. If the sub-tank is empty, check for water leakage, then check the level of the water in the radiator. If the level is low, add water to the radiator, then add water to the sub-tank.

23.3.3 CHECK FUEL LEVEL





⚠ WARNING

To prevent fire, make sure that the fuel does not overflow when you add fuel.

1. Check the fuel level on fuel gauge ① or sight gauge Ⓖ.

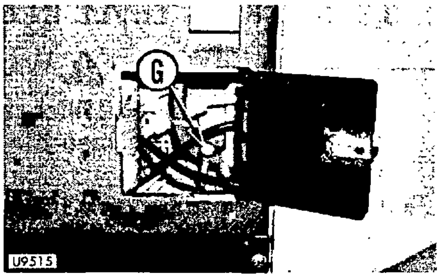
2. After completing operations, add fuel through fuel filler port Ⓕ to fill the tank.

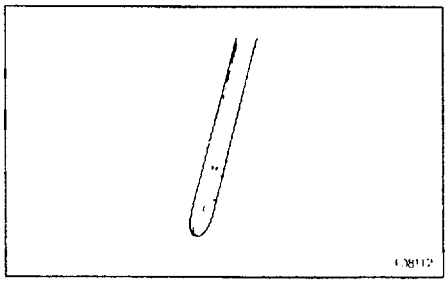
For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

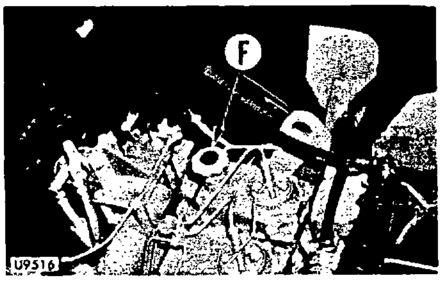
3. After adding fuel, tighten the cap securely.

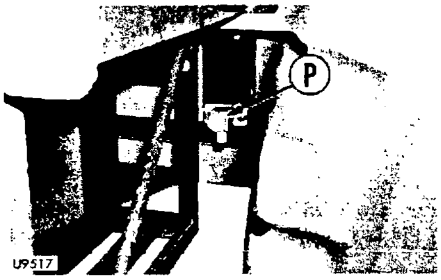
Fuel tank capacity : 300 ℓ (79.2 US gal, 66 UK gal)

23.3.4 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL









1. Open the right side cover of the engine.
2. Pull out dipstick Ⓖ and wipe the oil off with a cloth.
3. Insert dipstick Ⓖ into the oil filler guide again, then pull it out.
4. The oil level should be between the H and L marks on dipstick Ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler port Ⓕ. Swing the upper structure to the side when doing this.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

5. If the oil is above the H mark, drain the excessive engine oil from drain plug Ⓟ, then check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely.

REMARK

- When checking the oil level after operating the engine, stop the engine, then wait for at least 15 minutes before starting to check. When checking, make sure that the machine is not at an angle. Set it horizontal, then check the oil level.
- When adding oil, remove dipstick Ⓖ from the gauge guide to release the air from inside the crankcase.

23.3.5 CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

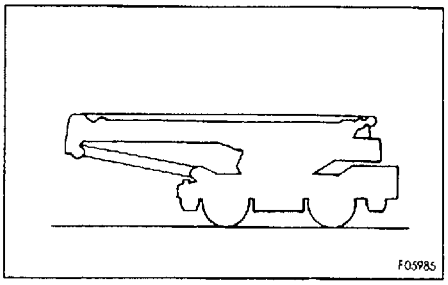
⚠ WARNING

- **When removing the oil filler cap, the oil may spurt out, so turn the cap slowly to release the internal pressure, then remove the cap carefully.**
- **When adding oil, if too much oil is added and the oil goes above the top line on the level gauge, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from drain plug Ⓟ.**

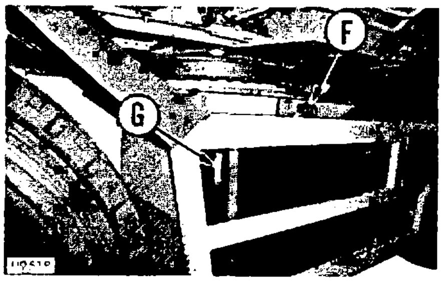
NOTICE

Do not add oil above the top mark. This will damage the hydraulic circuit and cause the oil to spurt out.

1. If the machine is not in the travel posture shown in the diagram on the right, start the engine, run the engine at low idling, set the machine to the travel posture, then stop the engine.
   For details of the travel posture, see "12.4 PREPARATIONS BEFORE MOVING MACHINE OFF".

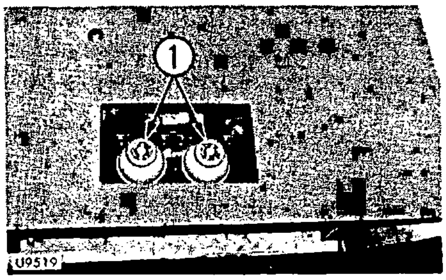


2. Check the oil level with sight gauge Ⓖ to confirm that it is between the top and bottom lines.
3. If it is below the bottom line, add hydraulic oil through oil filler port Ⓕ.



For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

23.3.6 CHECK TRAVEL BRAKE FLUID LEVEL, ADD FLUID



⚠ WARNING

When adding brake fluid, be careful not to mix mineral oil with the brake fluid. Even if only a small amount of mineral oil (engine oil, etc.) is in the brake fluid, the rubber parts in the brake fluid line will show an abnormal change in their properties, and this will lead to defective operation of the brakes. When adding brake fluid, always use a container that is used exclusively for brake fluid.

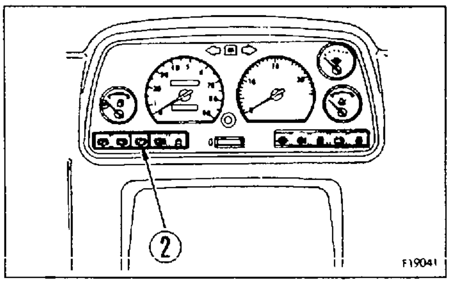
1. Check that the fluid level is at the MAX level in brake fluid tank ① (2 places).

2. If it is not up to the MAX level, add brake fluid (FMVSS DOT4 <Glycol type> or equivalent).

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

REMARK

If the fluid level is too low, brake oil level caution lamp ② in the meter portion lights up and the alarm buzzer sounds to warn the operator.
When adding brake fluid, be careful not to get the brake fluid on any painted surface. The brake fluid may attack the paint.

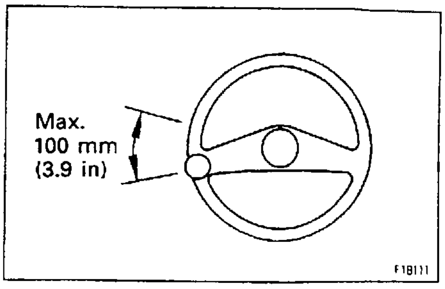


23.3.7 CHECK PLAY OF STEERING WHEEL

When measuring the play of the steering wheel, start the engine, and jack up the front wheels before measuring.

Standard: Max. 100 mm (3.9 in)

If the play is not within the standard, or the steering wheel vibrates abnormally, or pulls or is heavy, please contact your Komatsu distributor for repair.



23.3.8 CHECK TIRE INFLATION PRESSURE

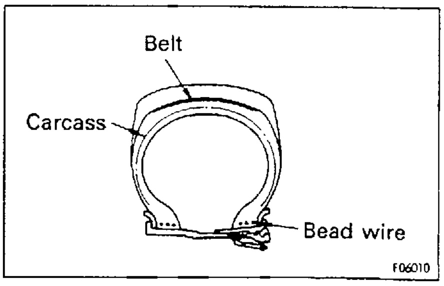
Measure the tire inflation pressure before starting operation when the tires are cold.
If the tire inflation pressure is too low, it will cause overload; if it is too high, it will cause cuts and shock bursts, so make sure that the tire inflation pressure matches the values in the table below.

	Inflation pressure
When traveling	784.5 kPa (8.0 kg/cm^2, 113.6 psi)
When working	784.5 kPa (8.0 kg/cm^2, 113.6 psi)

REMARK

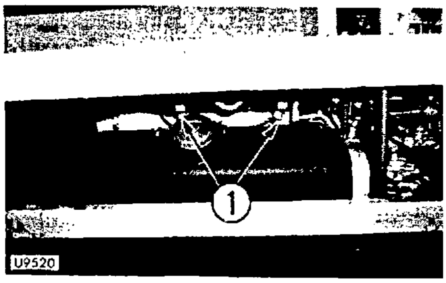
If the tire has any of the defects 1) to 5) listed below, it must be replaced with a new tire to ensure safety.

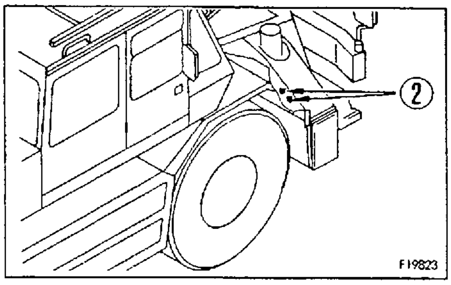
1) Tires where the bead wire is cut, bent, or greatly deformed
2) Tires with advanced wear, which show signs of slipping
3) Tires where the carcass or belt are damaged
4) Tires in which the ply or belt has separated
5) Tires which show deterioration, deformation, or growth in damage, and which are judged to be unable to withstand use



23.3.9 DRAIN WATER FROM AIR TANK

After finishing operations, stop the engine, then open drain valve ① in the dry tank and drain the water. In the same way, pull ring ② in the wet tank to drain the water.



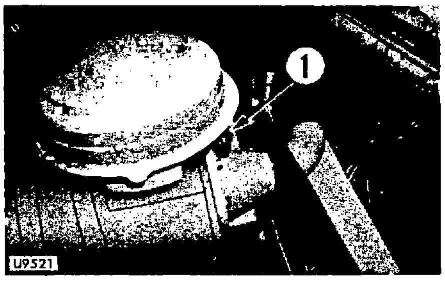


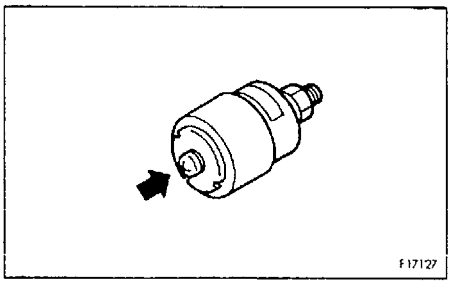
NOTICE

For machines equipped with an air dryer, check what is drained. If there is an abnormal amount of water or oil, replace the desiccant in the dryer or check for oil leaking up from the air compressor.

23.3.10 CHECK DUST INDICATOR

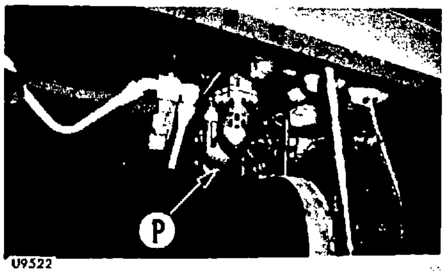
1. Check if the red piston has appeared in the clear portion of dust indicator ①.
2. If the red piston has appeared, immediately clean or replace the element.
   For details of the method of cleaning the element, see "23.2 WHEN REQUIRED".
3. After inspecting, cleaning, and replacing, press the knob of dust indicator ① to return the red piston to its original position.





23.3.11 DRAIN WATER FROM AIR FILTER

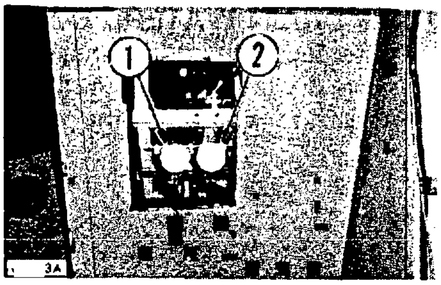
Loosen drain plug Ⓟ at the bottom of the air filter to drain the water.



23.3.12 CHECK SWING BRAKE FLUID LEVEL, ADD FLUID

23.3.13 CHECK WINCH BRAKE FLUID LEVEL, ADD FLUID

1. Check if the oil level can be seen at the MAX level of brake oil reservoirs ① (for the swing brake) and ② (for the winch brake) at the rear of the cab.
2. If it is not up to the MAX level, add hydraulic oil.



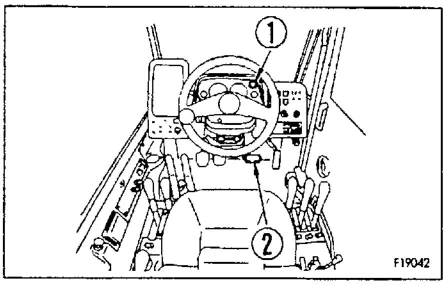
For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

23.3.14 CHECK BRAKING EFFECT

The stopping distance should be a maximum of 12 m (39.4 ft) when the machine travels at an initial speed of 35 km/h on a flat, dry concrete surface.
If the braking effect is poor, see "23.6 EVERY 250 HOURS SERVICE".

23.3.15 CHECK RISE IN AIR PRESSURE, CHECK EXHAUST NOISE FROM BRAKE VALVE

When the pressure inside the air tank is 0, check that it takes approx. 5 minutes to charge with air up to the range marked by the arrow on air pressure gauge ① with the engine at low idling, and less than 1.5 minutes when the engine is running at high idling.
If the rise in pressure is too slow, check for any leakage from the piping, and check the operation of the air compressor. Check also that the exhaust sound is normal when air is exhausted from the brake valve when brake pedal ② is depressed and then released.



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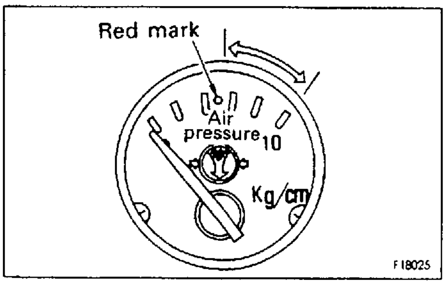

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23.3.16 CHECK FLASHING OF LAMPS, CHECK FOR DIRT, DAMAGE

23.3.17 CHECK DIRECTION OF BACKUP MIRROR, CHECK FOR DIRT OR DAMAGE

23.3.18 CHECK REFLECTORS AND NUMBER PLATE FOR DIRT OR DAMAGE

23.3.19 CHECK OPERATION OF HORN

23.3.20 CHECK ENGINE EXHAUST COLOR AND SOUND

23.3.21 CHECK OPERATION OF GAUGES

23.3.22 CHECK THAT ABNORMALITIES FROM PREVIOUS DAY HAVE BEEN REPAIRED

23.3.23 CHECK BRAKING EFFECT OF PARKING BRAKE

23.3.24 CHECK DOOR LOCK

23.3.25 CHECK OPERATION OF WIPERS, WINDOW WASHER, CHECK WASHER FLUID LEVEL

23.3.26 CHECK OPERATION OF STEERING MECHANISM

Check the turning of the steering wheel and the movement of the tires.

23.3.27 CHECK WIRE ROPE

Check the holder at the end of the rope, check the winding-on condition, and check for contact between ropes.

23.3.28 CHECK OUTRIGGER CHECK VALVE

· Check that there is no hydraulic drift of the jack cylinder when the outriggers are extended.

23.3.29 CHECK OPERATION OF OSS ELECTRONIC PANEL

For details, see "12.36 SETTING OVERLOAD SAFETY SYSTEM".

23.3.30 CHECK OPERATION OF WORK EQUIPMENT

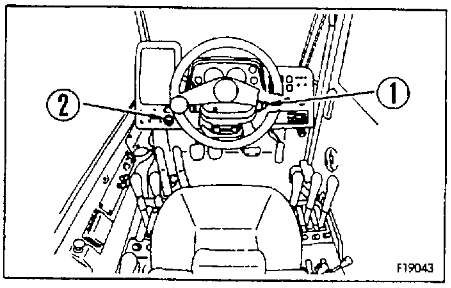
Check that the winding in and winding out of the winch, and the hoist, telescoping, and swing movement of the boom match the operation of the levers and pedals.

23.3.31 CHECK HOOK

Check the movement of the bearings, check for deformation ofthe hooks, check that the stopper for the wire rope is normal.

23.3.32 CHECK BRAKING EFFECT OF SWING BRAKE

23.3.33 CHECK OSS



1. Turn the key in starting switch ① to the START position and start the engine.
2. Set PTO switch ② to the "Operation 2" position.
3. Check that with Steps 1 and 2 the power of the OSS comes on, that all displays light up once within approx. 1 second, and that the buzzer sounds.
4. After carrying out the above operations, the outrigger mode will change to "ON-TIRE", so set it again.

If the power has been turned on, or if the PTO switch has been operated, or if the outrigger has been operated, for safety reasons the outrigger setting switch must be set again even when it is in the correct condition.

5. Raise the boom to a position above horizontal.
6. To check the automatic stop function, set the outrigger setting switch to the CHECK position.

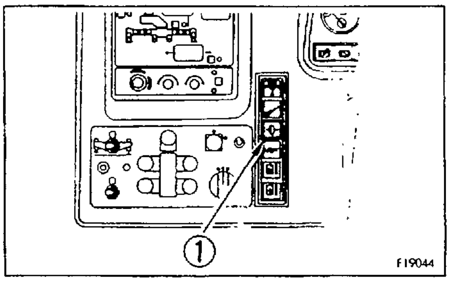
7. Operate the control levers and check the following items.
   1) Check that the boom does not extend even when the boom telescope lever is operated.
   2) Check that the winch does not wind in even when the winch control lever is operated.
   3) Check that the boom does not go down even when the boom hoist lever is operated.
   4) Check that the alarm buzzer sounds and the warning lamp is lighted up.

8. Use the following procedure to check that the display values are normal.
   Check with the jib and single top stowed away.
   1) Check that the boom length display value is "9.5 ± 0.2 m (31.2 ± 0.7 ft)" when the boom length is at the minimum.
   2) Stow away the jib and single top, extend the outriggers fully, and set the machine horizontal.
   3) Set the working mode setting switch to BOOM.
   4) Set the outrigger setting switch to MAX EXTEND.
   5) Set the working mode setting switch to match the number of lengths of rope used by the machine.
   6) Extend the boom fully, and check that the boom length display value is 30.5 ± 0.5 m (100.0 ± 1.6 ft).
   7) Lower the boom and set the angle display gauge to 30 ± 0.1°.
   8) Wind in the main hook to just before the overwind position, and check that after 1 minute the moment display is the display value given in METHOD FOR CHECKS BEFORE STARTING.

23.3.34 CHECK ACCUMULATOR PRESSURE

⚠ WARNING

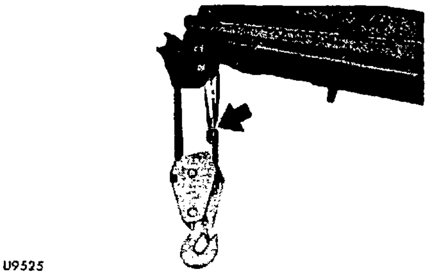
If the accumulator pressure caution lamp lights up and the alarm buzzer sounds, stop operations immediately.



1. Check that accumulator pressure caution lamp ① is OFF.

2. If it is lighted up, start the engine and wait until the pressure goes above the specified pressure. When it reaches the set pressure, the lamp will go out and the buzzer will stop.

23.3.35 CHECK FUNCTION OF SAFETY DEVICES (OVERWIND PREVENTION SYSTEM)



23.3.36 CHECK BRAKING EFFECT OF WINCH BRAKE

Raise the maximum load for the number of lengths of rope, and check that it remains stopped when the clutch is disengaged.

23.3.37 CHECK EFFECT OF WINCH CLUTCH

Raise the maximum load for the number of lengths of rope, and check that the load can be raised and lowered.

23.3.38 CHECK ELECTRIC WIRING

WARNING

If the fuse blows frequently, or if there is any sign of a short circuit in the electric wiring, always investigate and repair the cause.

Check for any damage to the fuse and for any sign of disconnections or short circuits in the electric wiring. Check also for loose terminals, and tighten if necessary.
Be particularly careful to check the following wiring.

- Battery
- Starting motor
- Alternator

When investigating and repairing the cause, please contactyour Komatsu distributor.

23.3.39 CHECK JIB WINCH ROPE

Check the jib winch rope.

- Check for broken strands, wear, kinks, corrosion, or abnormality in the stopper at the end of the cable.

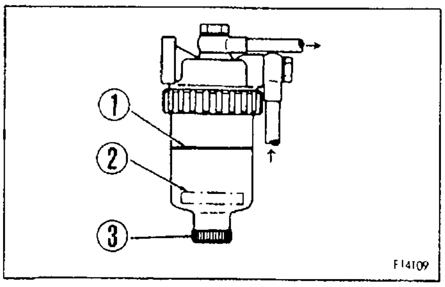
23.3.40 CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR, DRAIN WATER

The water separator separates water mixed in the fuel. If float ② is at or above red line ①, drain the water according to the following procedure:

1. Loosen drain plug ③ and drain the accumulated water until the float reaches the bottom.

2. Tighten drain plug ③.

3. If the air is sucked into fuel line when draining the water, be sure to bleed air in the same manner as for the fuel filter. See "23.7 EVERY 500 HOURS SERVICE".



23.4 EVERY 50 HOURS SERVICE

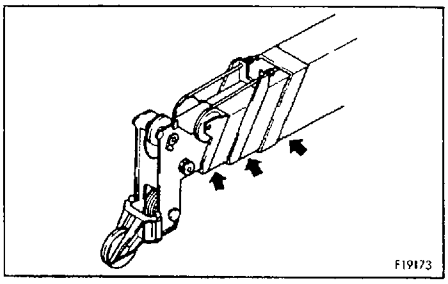
23.4.1 GREASING

1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.

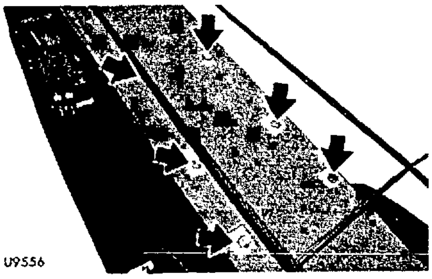
2. After greasing, wipe off any old grease that is pushed out.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

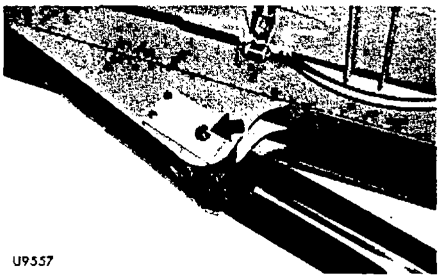
1. 2nd, 3rd, top boom bottom face (3 places)
   Extend the outriggers extend the boom horizontally or tilted to the front, and apply grease with a brush. Supply grease through the hole in the bottom surface of the boom to fill the grease bath at the rear of the pad.



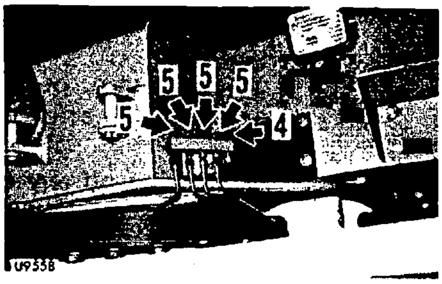
2. Boom slide pad (6 places)
   Remove the plugs and apply grease.



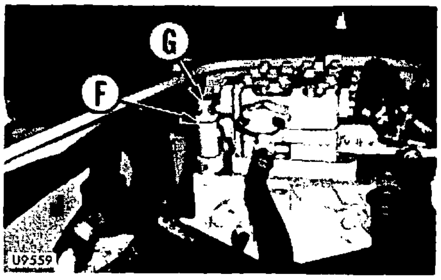
3. Hoist cylinder rod pin (1 place)



4. Swing pinion (1 place)
5. Swing circle (4 places)



23.4.2 CHECK OIL LEVEL IN TRANSMISSION CASE, ADD OIL



1. When carrying out the checks before starting the engine, check the oil level with dipstick Ⓖ.

2. Pull out dipstick Ⓖ and wipe the oil off with a cloth.

3. Insert dipstick Ⓖ into the oil filler guide again, then pull it out.

4. The oil level should be between the H and L marks on dipstick Ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler port Ⓕ.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

5. If the oil is above the H mark, stop the engine, wait for the oil to cool, then drain the engine oil from drain plug Ⓟ, and check the oil level again.

REMARK

If the machine is at an angle, set the machine horizontal before checking the oil level. Swing the upper structure to the side before adding oil.

23.4.3 DRAIN WATER, SEDIMENT FROM FUEL TANK

1. Drain the water and sediment before operating the machine.

2. Prepare a container to catch the fuel that is drained.

3. Remove drain plug Ⓟ at the bottom of the tank, and drain the fuel together with the sediment and water collected at the bottom of the tank.
   When doing this, be careful not to get the fuel over yourself.

4. When clean fuel comes out, tighten drain plug Ⓟ.

23.5 EVERY 100 HOURS SERVICE

Carry out the maintenance for EVERY 50 HOURS SERVICE at the same time.

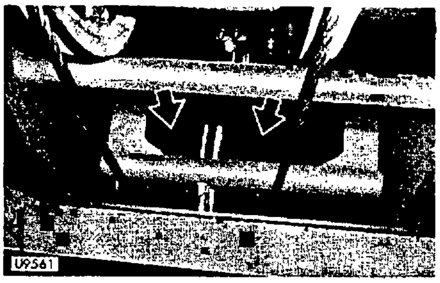
23.5.1 GREASING

1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.

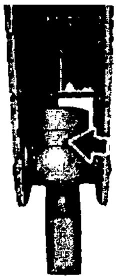
2. After greasing, wipe off any old grease that is pushed out.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

1. Wire rope (2 places)
   Coat the wire rope with red rope grease to prevent wear and rust. Remove the dirt from the surface of the rope first, then apply the grease with a brush.

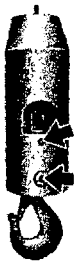


2. Main hook (1 place)



U7224

3. Auxiliary hook (2 places)



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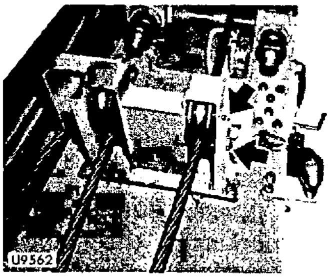
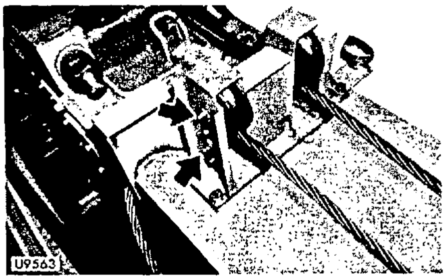
4. 1st boom front sheave (4 places)





23.6 EVERY 250 HOURS SERVICE

Carry out the maintenance for EVERY 50 HOURS SERVICE at the same time.

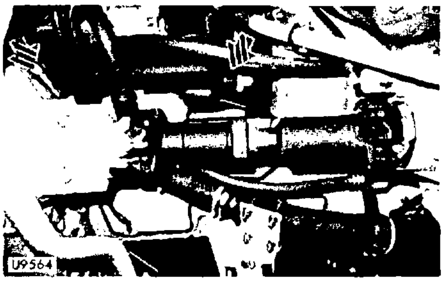
23.6.1 GREASING

1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.

2. After greasing, wipe off any old grease that is pushed out.

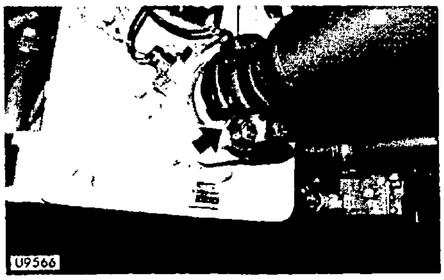
For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

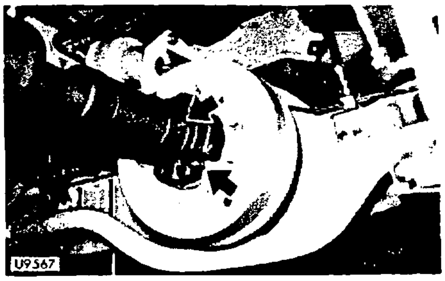
1. Drive shaft (8 places)
   Torque converter – transmission (2 places)



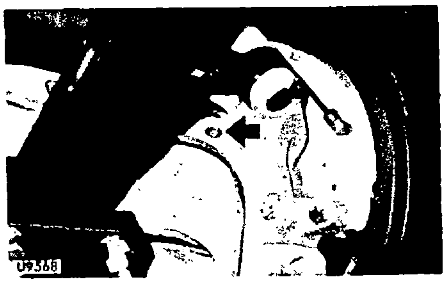
Transfer – axle (rear) (3 places)

Transfer – axle (front) (3 places)



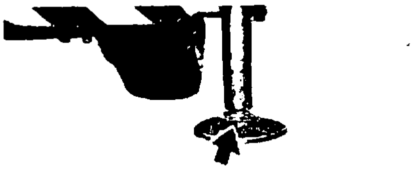


2. Axle joint (6 places)
   Check the position of the grease fitting on the axle joint through the greasing hole and move the machine so that the grease fitting faces the greasing hole, then carry out the greasing.
   (Front axle 4 places, rear axle 2 places)



[H-shaped outrigger]

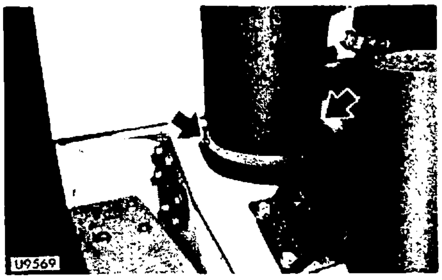
3. Outrigger float (4 places)



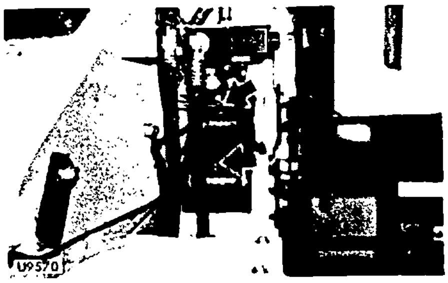
T8186

[X-shaped outrigger]

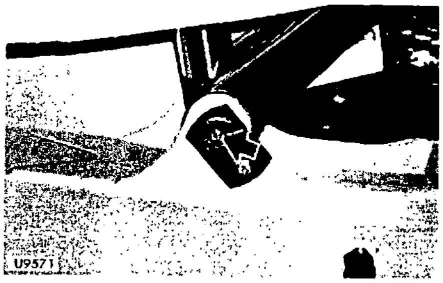
4. Outrigger jack cylinder trunnion pin (8 places)



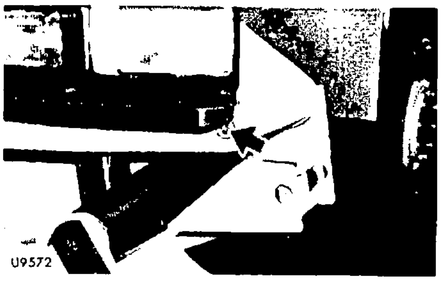
5. Outrigger support lever pin (8 places)



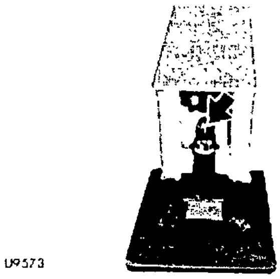
6. Outrigger jack cylinder rod pin (4 places)



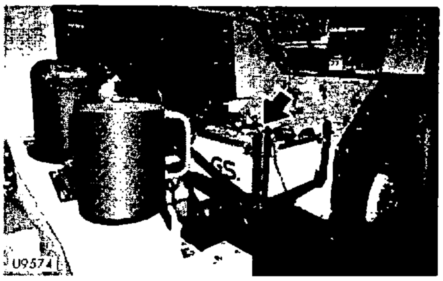
7. Outrigger jack lever support pin (4places)



8. Outrigger float (4 places)



23.6.2 CHECK BATTERY FLUID LEVEL



⚠ WARNING

- **The battery generates flammable gas so do not bring fire or sparks nearly battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skins, wash it off with large amounts of water, and consult a doctor.**

1. Remove the cap and check that the electrolyte is at the specified level (10 to 12 mm (0.4 to 0.5 in) above the plate). If the electrolyte level is low, add distilled water to the specified level. If the battery electrolyte is spilled, have dilute suphuric acid added.

2. Clean the air hole in the battery cap, then tighten the cap securely.

REMARK

When adding distilled water in cold weather, add it in the morning before starting operations to prevent the electrolyte from freezing.

23.6.3 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

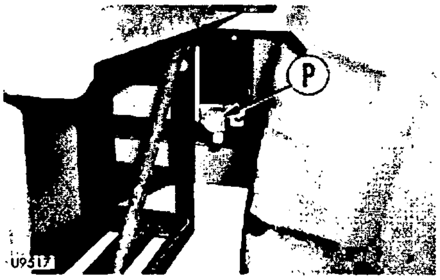
⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before changing the oil.

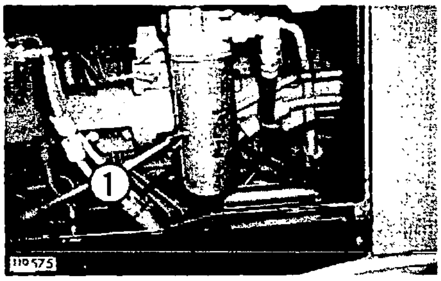
Prepare the following.

- Container to catch drain the oil: Min. 26 ℓ capacity
- Refill capacity: 26 ℓ (6.86 US gal, 5.72 UK gal)
- Filter wrench

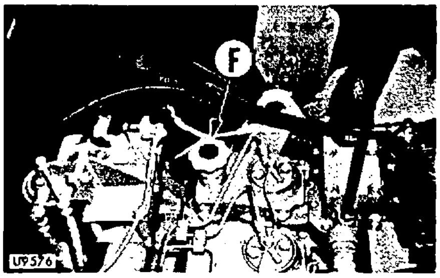
Swing the upper structure to a position where the engine hood can be opened.



1. Set a container immediately under drain plug Ⓟ to catch the oil that is drained.
2. Remove drain plug Ⓟ and drain the oil.
3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
4. Tighten drain plug Ⓟ.



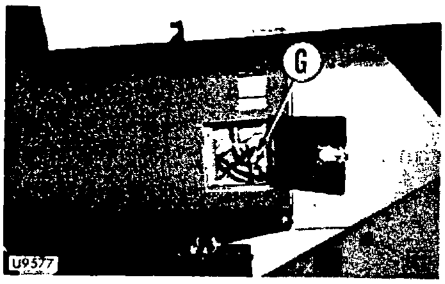
5. Using a filter wrench, turn filter cartridge ① counterclockwise to remove it.
   If the filter cartridge is removed immediately after the engine is stopped, a large amount of oil will come out, so wait for 10 minutes before removing it.
6. Clean the filter holder, coat the seal surface of the new filter cartridge with engine oil (or coat it thinly with grease), then install it to the filter holder.



7. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it a further 1/2 of a turn.
8. After replacing the filter cartridge, add engine oil through oil filler Ⓕ to the specified level.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

9. Run the engine at idling for a short time, then stop the engine, and check that the oil is up to the specified level on dipstick Ⓖ. For details, see "23.3 CHECK BEFORE STARTING".



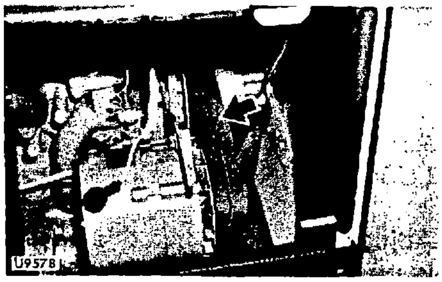
NOTICE

Change the oil and replace the cartridge once every 6 months, regardless of the number of hours operated.

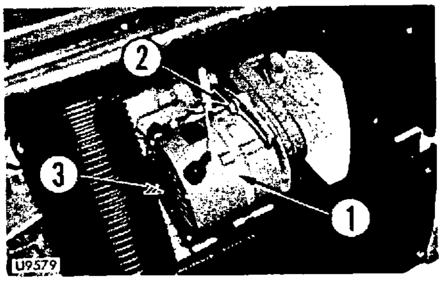
23.6.4 CHECK FAN BELT TENSION, ADJUST

Checking

The belt should deflect by approx. 10 mm (0.4 in) when pressed with the finger (with a force of approx. 6 kg) at a point midway between the fan pulley and alternator pulley.

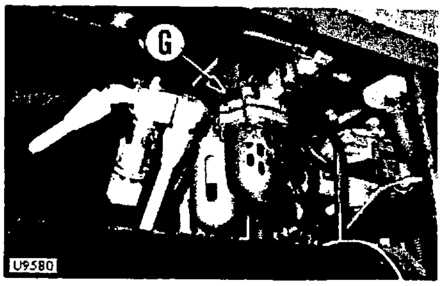


Adjusting



1. Insert a bar between alternator ① and the cylinder block to fix alternator ① in position.
   When fixing the alternator in position, insert a wooden block between the bar and alternator ① to prevent damage to the alternator.
2. Loosen bolts and nuts ② and ③.
3. Move alternator ① with the bar so that the deflection of the belt is approx. 10 mm (0.4 in) (approx. 6 kg).
4. Tighten the bolts and nuts ② and ③ to fix alternator ① in position.
5. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
6. Replace the belt if it has stretched and has no allowancefor adjustment, or if there are any cuts or cracks in the belt.
   When replacing any belt, replace all the belts as a set.
7. If the belts have been replaced, operate the machine for one hour, then check and adjust again.

23.6.5 CHECK OIL LEVEL IN LUBRICATOR, ADD OIL



Use dipstick Ⓖ to check the oil level. If the oil level is low, add engine oil through the dipstick guide.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

Adjust the knob so that one drop of oil drips when the packing switch is operated 3 to 5 times.
Carry out the adjustment when the oil is fully warmed up.

23.6.6 CHECK BRAKING EFFECT OF PARKING BRAKE, ADJUST

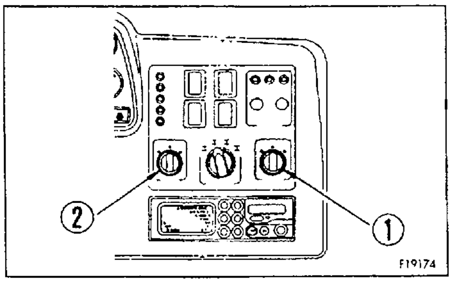
NOTICE

When checking the braking effect of the parking brake, a large force is applied to the drive system, and as the same time, excessive force is applied to the transmission, so do not carry out this operation more than necessary.

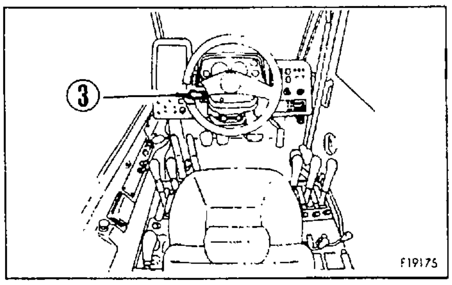
Checking

1. Set parking brake switch ① to the PARKING position and travel mode selector switch ② to the H MODE position, and check that the parking brake indicator lamp lights up.

2. Set gear shift lever ③ to the D or L position.



3. Check that the machine does not move off even when the accelerator pedal is depressed.



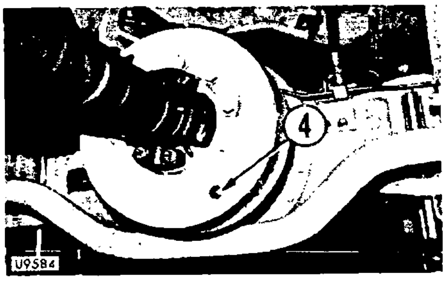
REMARK

The machine may move slightly, but this does not indicate any abnormality.

Adjusting

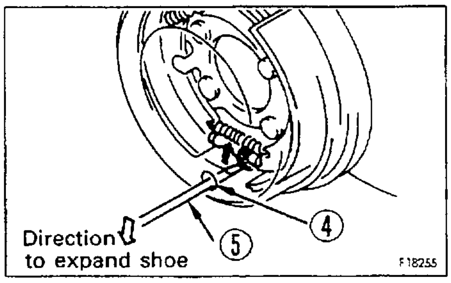
If the braking effect is poor, adjust as follows.

1. Move the machine so that brake drum adjustment hole ④ is approx. 15 mm (0.6 in) to the right of the point directly under the center. The brake drum rotates one turn if the machine is moved approx. 26.3 cm (10.4 in).

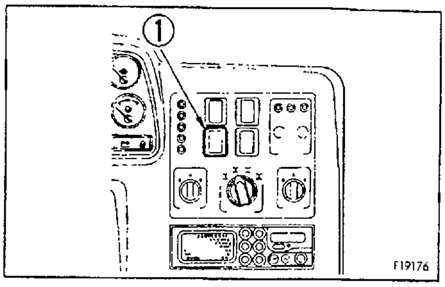


2. Insert screwdriver ⑤ through adjustment hole ④, and push down on the handle of the screwdriver to rotate the adjustment screw in the direction to expand the shoe. After bringing the shoe into tight contact with the drum, turn back 8 notches. (This will give a shoe clearance of 0.23 mm (0.01 in).)

3. After adjusting, travel for approx. 500 m (1640 ft), and check that the temperature of the drum is not higher than the temperature of the neighboring drive shaft to confirm that the brake is not dragging.



23.6.7 CHECK OPERATION OF EMERGENCY STEERING SYSTEM



⚠ WARNING

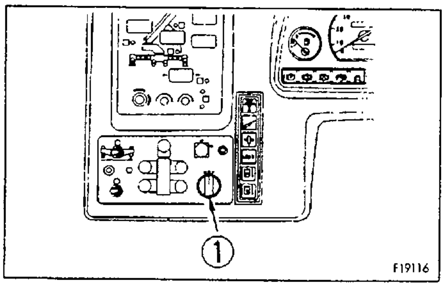
Do not use the emergency steering continuously for more than 5 minutes.

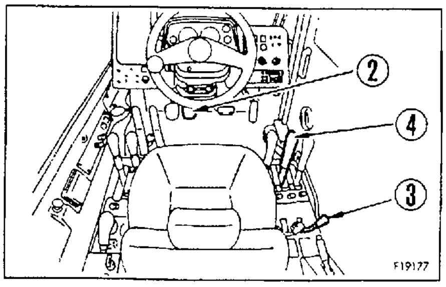
1. Stop the engine, press emergency steering switch ①, and check that the pilot lamp inside the switch lights up.

2. Turn the steering wheel and check that it can be operated for 20 seconds.

3. Press emergency steering switch ① and check that the lamp goes out.

23.6.8 CHECK BRAKING EFFECT OF WINCH BRAKE, ADJUST





Checking

1. Set PTO switch ① to the "Operation 2" position.

2. Depress main winch brake pedal ②, set main winch clutch lever ③ to the ON position, then operate main winch control lever ④ to the WIND OUT position, and check that the main winch hook does not move.
   Carry out the same procedure for the auxiliary winch brake.

Adjusting

If the braking effect is poor, there is moisture on the band, so after depressing the brake pedal, operate in the WIND OUT and WIND IN directions and check that there is no slipping.

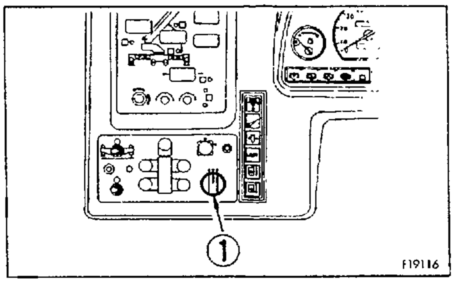
NOTICE

Check the winch brake also when a heavy load is raised.

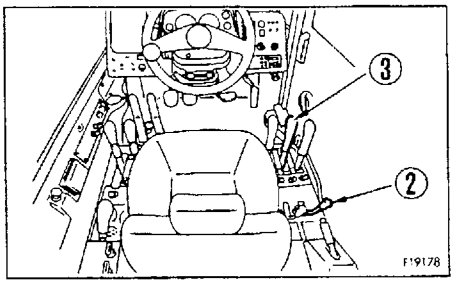
23.6.9 CHECK EFFECT OF WINCH CLUTCH, ADJUST

Checking

1. Set PTO switch ① to the "Operation 2" position.



2. Set main winch clutch lever ② to the ON position, then set main winch control lever ③ to the WIND IN position and check that the main hook is wound in.
   Carry out the same procedure for the auxiliary winch clutch.



Bleeding air

If the hook does not wind in, bleed the air as follows.

1. Turn the clutch brake to a position where it is easy to bleed the air.

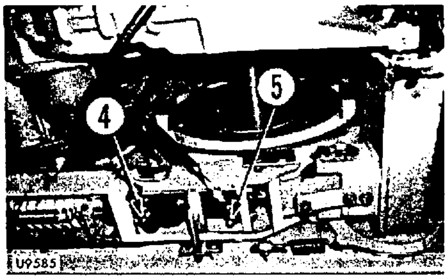
2. Remove the cap from air bleed plug ④ of the main winch clutch cylinder, then insert a vinyl tube and put the other end in a glass container holding hydraulic oil.

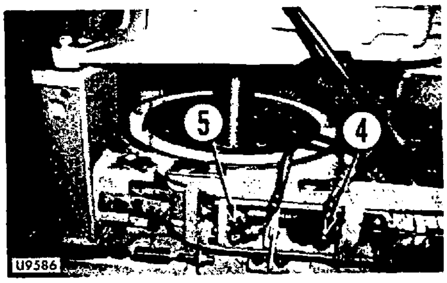
3. Loosen air bleed plug ④.

4. Set the main winch clutch lever to the ON position and check the bubbles in the brake fluid and hydraulic oil.

5. When no more bubbles are seen, tighten air bleed plug ④, fit the cap, then return the main winch clutch lever to the OFF position.

Bleed the air in the same way from air bleed plug ⑤ of the auxiliary winch clutch cylinder.





23.6.10 CHECK FOR LOOSE SWING CIRCLE MOUNTING BOLTS, TIGHTEN

1. Check that there is no looseness in swing circle mounting bolts ① and ②.

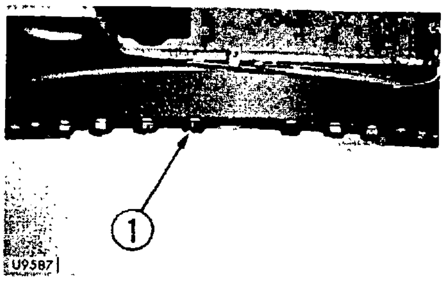
2. If any looseness is found, tighten as follows.

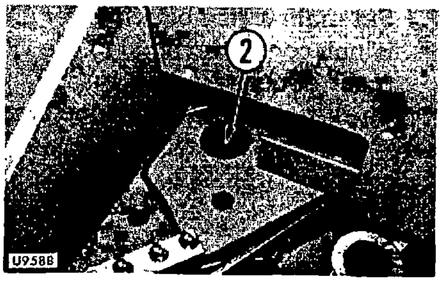
- When tightening bolt ②, remove upper body work cover ③ and the blind cover.

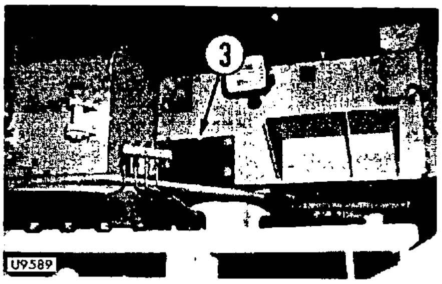
- When tightening, insert a handle in the socket wrench and use a bar.

- When tightening the upper mounting bolts, swing the upper structure while tightening.

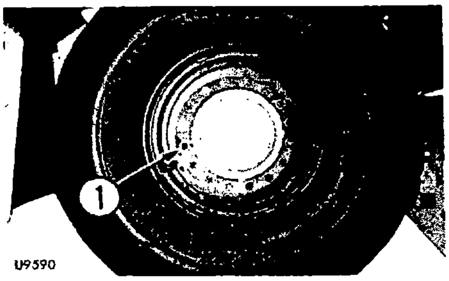
Tightening torque: 927 ± 103 Nm (94.5 ± 10.5 kgm, 684 ± 76 lbft)







23.6.11 CHECK FOR LOOSE WHEEL HUB BOLTS, NUTS, TIGHTEN



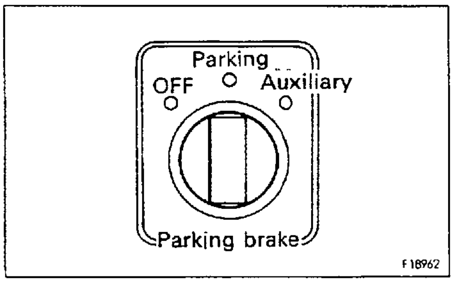
⚠ WARNING

If the wheel hub bolts or nuts ① are loose, this may lead to premature wear of the tires or serious accident, so always check that there are no loose nuts or bolts.

NOTICE

Even if it appears that there are no loose nuts or bolts, always check every nut and bolt. Check also that there is no damage to the rim. If any hub bolt is broken, replace all the bolts for that wheel.

1. Set the parking brake switch to the PARKING position to apply the parking brake.

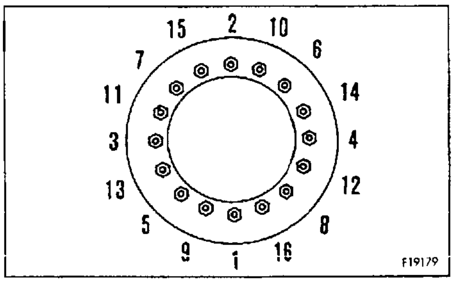


2. Fit a socket wrench and bar to the wheel hub bolts and nuts ①, and turn in the tightening direction to tighten the bolts and nuts.

Tightening torque: 471 ± 49 Nm (48 ± 5 kgm, 341 ± 36 lbft)

NOTICE

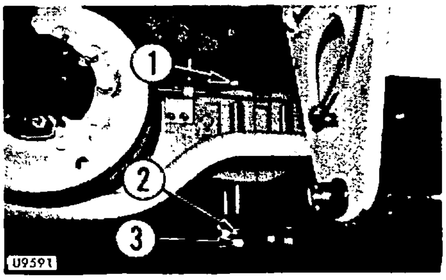
After replacing the wheel, tighten the nuts in the order shown in the diagram on the right. Use three passes to tighten to the specified torque, then travel for 20 to 40 km, and tighten again to the specified torque.



23.6.12 CHECK LEAF SPRING, TIGHTEN

Check for any looseness in bolt ①, and nuts ② and ③ tightening the leaf spring. Tighten if they are loose.
When tightening, insert a handle in the socket wrench and use a bar.

Tightening torque: 927 ± 103 Nm (94.5 ± 10.5 kgm, 684 ± 76 lbft)



23.6.13 CHECK DRIVE SHAFT

Check when greasing the drive shaft.

Check for any abnormalities, such as looseness of the drive shaft connection, play in the spline or bearing, or vibration of the shaft. If the play or vibration is excessive and it is considered to be abnormal, contact your Komatsu distributor for inspection.

23.6.14 CHECK FOR DAMAGE TO ANY STRUCTURE

Check for any damage to the welded structural parts of the boom and outrigger. Check the following parts in particular.

- Tip of boom
- Root of boom
- Outer opening of outrigger

23.6.15 CHECK FOR WEAR OF DISC BRAKE PAD

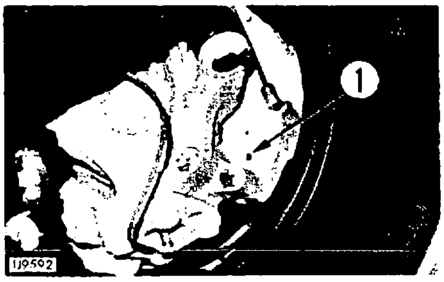
⚠ WARNING

If discs are used when they have exceeded the wear limit, this will result not only in damage to the disc, but there is also danger that the brakes may not work. To prevent this problem, check the wear frequently when it is near the wear limit and replace the pad at the proper time.

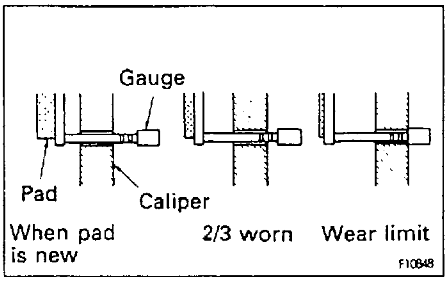
NOTICE

- **The wear of the pads on the front, rear, left, and right wheels is not necessarily the same, so always check the pads at all places.**
  If any one of the pads has reached the wear limit, always replace all the pads, or replace the set of 8 pads for the front wheel or the set of 4 pads for the rear wheel separately.
- **If it is considered that the wear will exceed the wear limit before the next inspection (250 hours), inspect the wear every 50 hours.**

1. Extend the outriggers fully and lock the suspension lift.
2. Set the steering mode switch to the "4 wheel" position and turn the steering wheel fully to either the left or right.
3. Insert an inspection gauge through wear inspection hole ① in the caliper to check the wear.



4. If the head of the inspection gauge is at the inlet port of the hole, the wear limit has been reached, so replace the pads.
   If the result of the inspection shows that the pads must be replaced, contact your Komatsu distributor for replacement.



23.7 EVERY 500 HOURS SERVICE

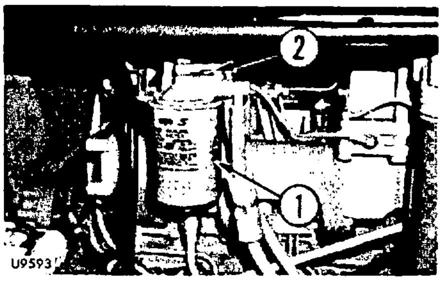
Carry out the maintenance for EVERY 50 HOURS, EVERY 100 HOURS, and EVERY 250 HOURS SERVICE at the same time.

23.7.1 REPLACE FUEL FILTER CARTRIDGE

⚠ WARNING

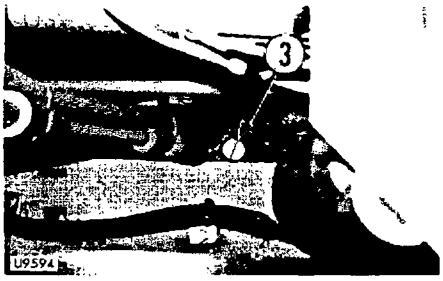
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**

Prepare a filter wrench and a container to catch the fuel.



1. Set the container to catch the fuel under the filter cartridge.
2. Using a filter wrench, turn filter cartridge ① to the left to remove it.
3. Clean the filter holder, coat the packing surface of the new filter cartridge with engine oil, then install the cartridge.
4. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten a further 1/2 to 3/4 of a turn.

If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the clearance at the packing, so always tighten to the correct angle.



5. After replacing filter cartridge ①, loosen air bleed plug ②.
6. Loosen the knob of feed pump ③, and pump it up and down until no more bubbles come out with the fuel from air bleed plug ②.
7. Tighten air bleed plug ②.

8. After replacing the filter cartridge, start the engine and check for leakage of fuel from the filter seal surface.
   If there is any leakage, check that the filter cartridge is tightened correctly. If fuel still leaks, repeat Steps 1 and 2 to remove the filter cartridge, then check the packing surface for damage or foreign material.
   If any damage or foreign material is found in the packing, replace the packing with a new part, and repeat Steps 3 to 8 to install the filter cartridge.

If the engine misfires or black smoke comes out when starting the engine after it has run out of fuel, bleed the air from the fuel line as follows.

9. Loosen the connection at the outlet port of the fuel injection pump, and operate the feed pump to bleed the air in the same way as when installing the fuel filter.

10. After bleeding the air, tighten the connection of the fuel outlet port, push in the knob of the feed pump, then tighten it to hold it in position.

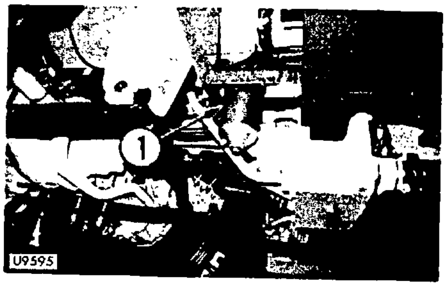
23.7.2 REPLACE TRANSMISSION OIL FILTER CARTRIDGE

WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before replacing the filter.

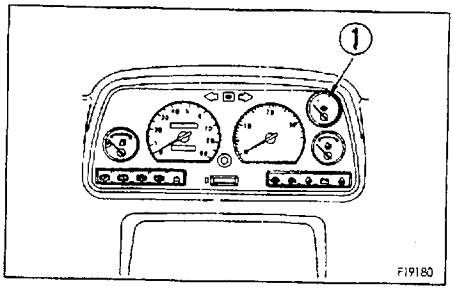
Prepare a filter wrench.

1. Using the filter wrench provided with the machine, remove cartridge ①.
2. Coat the packing surface of the new cartridge with engine oil and install it to the filter holder.
3. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten a further 1/2 to 3/4 of a turn.



23.7.3 CHECK AIR GOVERNOR

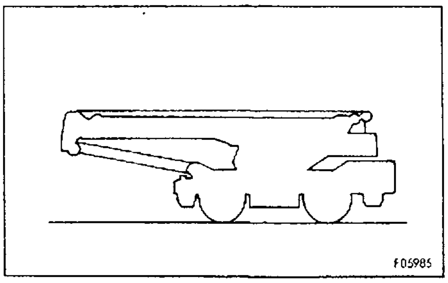
1. Open the valve of the air tank, release the air to make the air pressure 0 kPa (0 kg/cm^2, 0 psi), then tighten the valve.
2. Start the engine, and check that the governor is cut and that compressed air is released when air pressure gauge ① reaches 834 – 892 kPa (8.5 – 9.1 kg/cm^2, 121 – 129 psi).
3. With the engine still running, depress the brake pedal repeatedly and check that the governor is engaged and the air pressure inside the tank starts to rise when air pressure gauge ① is 716 – 745 kPa (7.3 – 7.6 kg/cm^2, 104 – 108 psi).



23.7.4 REPLACE HYDRAULIC FILTER ELEMENT

⚠ WARNING

- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before replacing the element.**
- **When the cover is removed, it may fly off under the force of the spring, so loosen the bolts gradually.**



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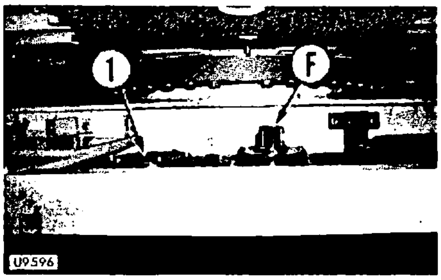

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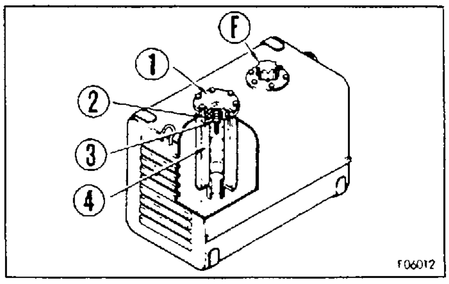
1. Set the machine to the travel posture.
2. Open filler port Ⓕ and leave it for several minutes to fully release the pressurization inside the tank.
3. Remove cover ①, then remove spring ② and valve ③, and take out element ④.
4. Clean the inside of the case and the parts that have been removed, then install a new element.



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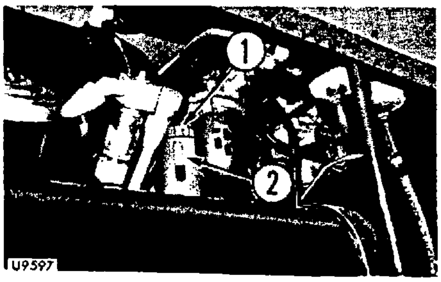
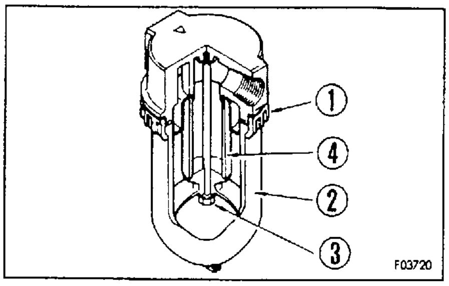
23.7.5 CLEAN AIR FILTER

1. Loosen ring ①, remove case ②, loosen bolt ③, then remove element ④.



2. Use gasoline, thinner, or triethane to remove the dirt or oil stuck to the element.



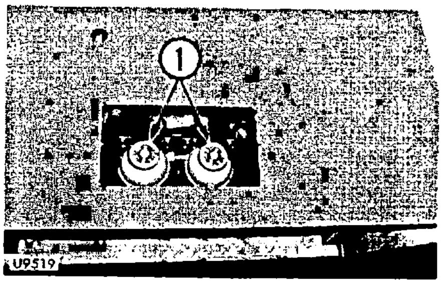
3. Wash all parts other than the element in kerosene or a neutral washing agent.

Do not use any organic solvent for parts other than the element. When cleaning, do not use a wire brush. It causes clogging.

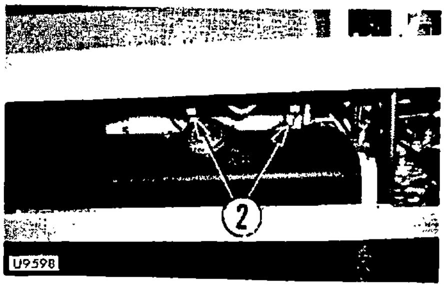
4. After cleaning, rinse in hot water, blow with compressed air to remove the solvent, then assemble.

23.7.6 CHECK BRAKE ALARM SYSTEM

1. Set the starting switch to the ON position, then lift up cap ① (2 places) of the brake fluid tank and check that the brake fluid monitor lights up.



- Set the parking brake switch to the PARKING position, then carry out the following checks.



2. After checking that the air pressure gauge is in the specified range, stop the engine, then open drain valve ② at the bottom of the wet air tank to reduce the air pressure, and check that the buzzer sounds.

3. Close drain valve ②, start the engine, and when the air pressure gauge enters the specified range, stop the engine.

4. Open drain valve ② and check that the buzzer sounds.

23.7.7 CHANGE TRAVEL BRAKE FLUID

Contact your Komatsu distributor to have the travel brake fluid changed.

23.8 EVERY 1000 HOURS SERVICE

Carry out the maintenance for EVERY 50 HOURS, EVERY 100 HOURS, EVERY 250 HOURS, and EVERY 500 HOURS SERVICE at the same time.

23.8.1 CHANGE OIL IN SWING MACHINERY CASE

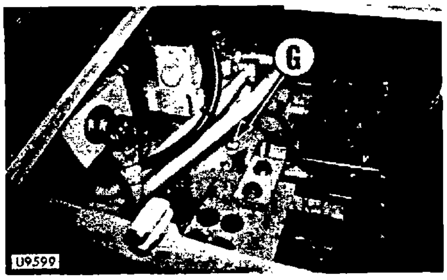
WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

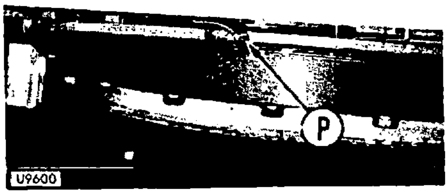
Prepare the following.

- Container to catch drained oil: Min. 1.6 ℓ capacity
- Refill capacity: 1.6 ℓ (0.42 US gal, 0.35 UK gal)
- Socket wrench, bar, funnel

1. Set the container to catch the oil immediately under drain plug Ⓟ.



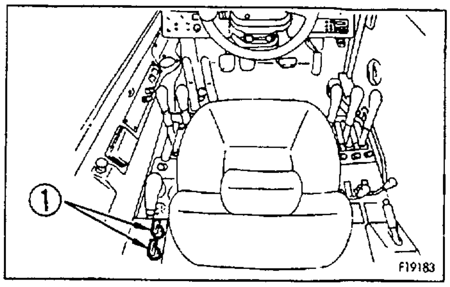
2. Open the cover on the left side of the upper structure, and using the socket wrench and bar, remove oil level gauge Ⓖ.



3. Remove drain plug Ⓟ, drain all the oil, then tighten the drain plug again.
4. Use the funnel that is provided with the machine, and add gear oil through oil level plug Ⓖ to the specified level.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

23.8.2 CHECK FUNCTION OF WINCH DRUM



1. Set winch drum lock lever ① to the LOCK position, then operate the winch lever and check the following.

- WIND IN: Possible
- WIND OUT: Locked

2. Set winch drum lock lever ① to the FREE position, then operate the winch lever and check the following.

- WIND IN: Possible
- WIND OUT: Possible

Carry out the above check for both the main winch and auxiliary winch.

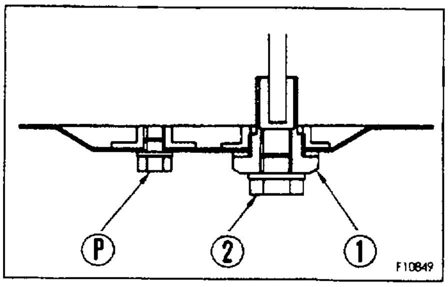
23.8.3 CLEAN FUEL TANK STRAINER

⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

1. Set a container to catch the fuel under drain plug Ⓟ at the bottom of the fuel tank.
2. Remove drain plug Ⓟ, drain the fuel, then tighten drain plug Ⓟ.
3. Remove strainer ① and plug ②, and clean them.
4. After installing the strainer, add fuel through the fuel filler port.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



23.8.4 CHANGE SWING BRAKE FLUID

Contact your Komatsu distributor to have the swing brake fluid changed.

23.8.5 CHANGE WINCH BRAKE FLUID

Contact your Komatsu distributor to have the winch brake fluid changed.

23.8.6 CHECK PLAY OF TURBOCHARGER ROTOR

Contact your Komatsu distributor for inspection.

23.8.7 CHECK TIGHTENING PORTIONS OF TURBOCHARGER

Contact your Komatsu distributor for inspection.

23.8.8 REPLACE CORROSION RESISTOR CARTRIDGE

⚠ WARNING

If the engine has been operated, all parts will be at a high temperature, so never try to replace the cartridge immediately after stopping the engine.
Always wait for the engine and other parts to cool down.

Prepare the followings

- Container to catch drained coolant
- Filter wrench

1. Close valves.

2. Set a container to catch the coolant under the cartridge.

3. Using filter wrench, remove cartridge.

4. Clean the filter holder, coat the packing surface and thread of the new cartridge with engine oil, then install it to the filter holder.

5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tigthten it up 2/3 of a turn. If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of coolant. If the filter cartridge is too loose, coolant will also leak from the packing, so always tighten to the correct amount.

6. Open valves.

7. After replacing the cartridge, start the engine and check for any leakage of water from the filter seal surface. If there is any water leakage, check if the cartridge is tightened properly.

23.9 EVERY 2000 HOURS SERVICE

Carry out the maintenance for EVERY 50 HOURS, EVERY 100 HOURS, EVERY 250 HOURS, EVERY 500 HOURS, and EVERY 1000 HOURS SERVICE at the same time.

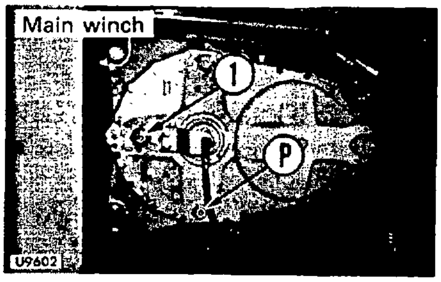
23.9.1 CHANGE OIL IN WINCH REDUCTION GEAR CASE

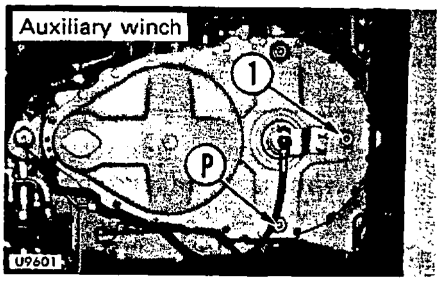
⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

Prepare the following.

- Container to catch drained oil: Min. 10 ℓ capacity
- Refill capacity: 10 ℓ (2.64 US gal, 2.22 UK gal) (both main winch and auxiliary winch)





1. Remove level plug ①.
2. Set a container to catch the oil under drain plug Ⓟ.
3. Remove drain plug Ⓟ, drain the oil, then tighten drain plug Ⓟ again.
4. Add gear oil through level plug hole ① until the oil overflows.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

5. Tighten level plug ①.

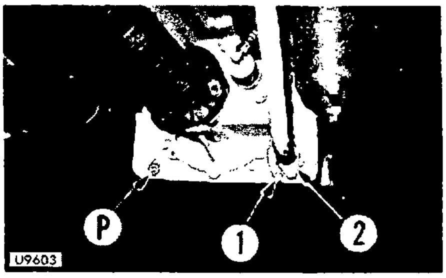
23.9.2 CHANGE OIL IN TRANSMISSION CASE, TORQUE CONVERTER CASE, CLEAN STRAINER

⚠ WARNING

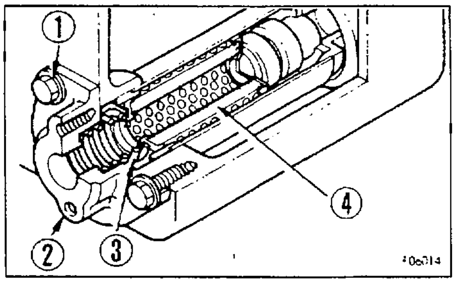
The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

Prepare the following.

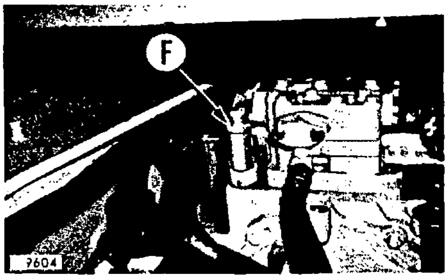
- Container to catch drained oil: Min. 25 ℓ capacity
- Refill capacity: 25 ℓ (6.60 US gal, 5.50 UK gal)



1. Set a container to catch the oil under drain plug Ⓟ.
2. Remove drain plug Ⓟ, drain the oil, then tighten drain plug Ⓟ again.
3. Remove bolt ①, then remove cover ② and take out spring ③.



4. Hook your finger inside strainer ④, and pull it out to remove it. If the strainer is damaged, replace it with a new part.
5. Use clean diesel fuel or flushing oil to remove the dirt stuck to the strainer. Wash the inside of the case and the removed parts at the same time.
6. Install the strainer.



7. After installing the strainer, replace the transmission oil filter cartridge.
   For details, see "23.7 EVERY 500 HOURS SERVICE".
8. Add engine oil through oil filler port Ⓕ to the specified level.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

9. After filling with oil, check that the oil is at the specified level.
   For details, see "23.4 EVERY 50 HOURS SERVICE".

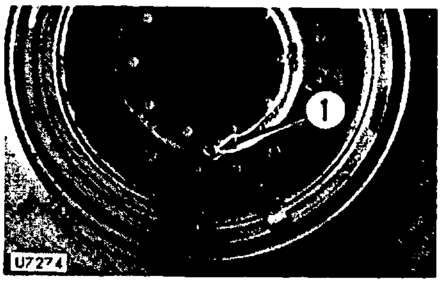
23.9.3 CHANGE OIL IN FINAL DRIVE GEAR CASE (4 PLACES)

⚠ WARNING

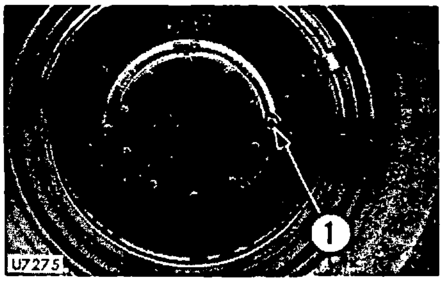
The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.

Prepare the following.

- Container to catch drained oil: Min. 14 ℓ capacity
- Refill capacity (each): 3.5 ℓ (0.92 US gal, 0.77 UK gal)
- Socket wrench



1. Stop the machine so that plug ① is directly at the bottom.
2. Set the container to catch the oil under plug ①.
3. Remove plug ①, drain the oil, then tighten plug ① again.

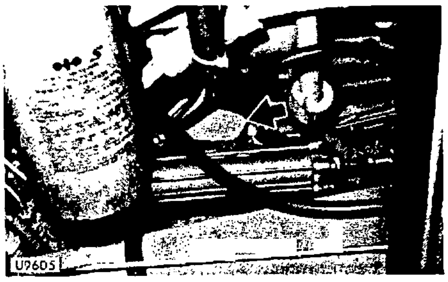


4. Move the machine so that the TOP casting mark on the final drive case cover is at the top.
5. Add gear oil through plug hole ① to the specified level.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

6. After filling with oil, check that the oil is at the specified level. For details, see "23.2 WHEN REQUIRED".

23.9.4 CLEAN ENGINE BREATHER ELEMENT



1. Loosen the clamp, then remove the hose and take out the breather.

2. Wash the whole breather in diesel fuel or flushing oil, blow it dry with compressed air, then install it.

3. Inspect the hoses, and if there is any deteriorated oil (sludge) stuck inside the hose, replace it with a new part.

Wipe off the dirt around the breather before removing it.
Check the O-ring, and replace it with a new part if necessary. Coat with engine oil when installing.

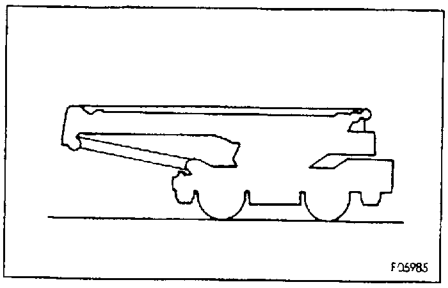
23.9.5 CHANGE OIL IN HYDRAULIC TANK

⚠ WARNING

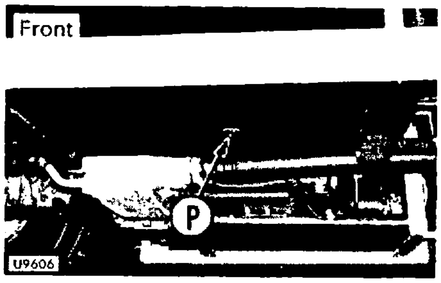
The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before changing the oil.
When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

Prepare the following

- Container to catch drained oil: Min. 400 ℓ capacity
- Refill capacity: 400 ℓ (105.6 US gal, 88.0 UK gal)

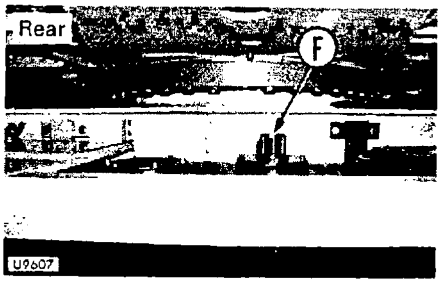


1. Set the machine to the travel posture, then set the parking brake switch to the ON position.
2. Set a container to catch the oil under drain plug Ⓟ at the bottom of the tank.
3. Remove drain plug Ⓟ, drain the oil, then tighten drain plug Ⓟ again.
4. Replace the filter element.
   For details, see "23.7 EVERY 500 HOURS SERVICE".

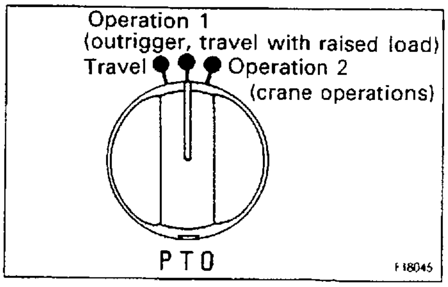


5. Add hydraulic oil through oil filler port Ⓕ to the specified level.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



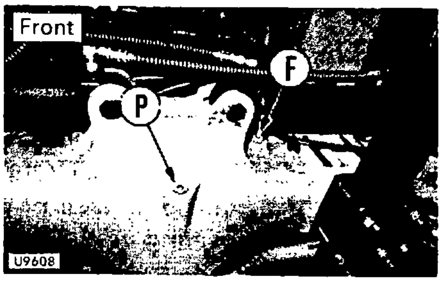
6. Set the PTO switch to the "Operation 1" position, run the engine at low idling for approx. 2 to 3 minutes, then check that the oil is at the specified level.
   For details, see "23.3 CHECK BEFORE STARTING".

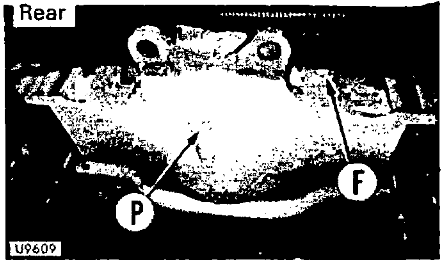


23.9.6 CHANGE OIL IN DIFFERENTIAL GEAR CASE (2 PLACES)

⚠ WARNING

The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.





Prepare the following

- Container to catch drained oil: Min. 44 ℓ capacity
- Refill capacity (front and rear, each): 22 ℓ (5.81 US gal, 4.84 UK gal)

1. Set a container to catch the oil under drain plug Ⓟ at the bottom of the tank.
2. Remove drain plug Ⓟ, drain the oil, then tighten drain plug Ⓟ again.
3. Add gear oil through oil filler port Ⓕ to the specified level.

For details of the oil to use, see "19. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

4. After filling with oil, check that the oil is at the specified level. For details, see "23.2 WHEN REQUIRED".

23.9.7 CLEAN TURBOCHARGER, CHECK

Contact your Komatsu distributor for cleaning and inspection.

23.9.8 CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn and the bearing may have run out of grease, so contact your Komatsu distributor for inspection and repair.

In cases where the engine is started frequently, carry out this inspection every 1000 hours.

23.9.9 CHECK ENGINE VALVE CLEARANCE, ADJUST

Contact your Komatsu distributor for inspection and maintenance.

23.9.10 CHECK VIBRATION DAMPER

Check the outside surface of the rubber for cracks and peeling. If any cracks or peeling are found, contact your Komatsu distributor for replacement.

23.9.11 REPLACE AIR DRYER DESICCANT (FOR MACHINES EQUIPPED WITH AIR DRYER)

Contact your Komatsu distributor for replacement.

23.10 EVERY 4000 HOURS SERVICE

Carry out the maintenance for EVERY 50 HOURS, EVERY 100 HOURS, EVERY 250 HOURS, EVERY 500 HOURS, EVERY 1000 HOURS, and EVERY 2000 HOURS SERVICE at the same time.

23.10.1 CHECK WATER PUMP

Check for play in the pulley, leakage of oil or water, and clogging of the drain hole. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement.

23.10.2 CHECK AIR COMPRESSOR, ADJUST

Contact your Komatsu distributor for inspection and adjustment.

SPECIFICATIONS

24. SPECIFICATIONS

LW250-3
[Machines with equipped with H-shaped outrigger]

Performance

	Boom length	Capacity	Conditions
• Crane capacity	9.5 m (31.16 ft)	26.0 t x 3.5 m (11.48 ft)	Outrigger fully extended, 360° operations
	16.5 m (54.12 ft)	19.0 t x 4.0 m (13.12 ft)	
	23.5 m (77.08 ft)	12.5 t x 5.0 m (16.4 ft)	
	30.5 m (100.04 ft)	7.0 t x 8.0 m (26.24 ft)	
	9.5 m (31.16 ft)	9.0 t x 3.0 m (9.84 ft)	Outrigger not used, 360° operations
	9.5 m (31.16 ft)	14.0 t x 3.5 m (11.48 ft)	Outrigger not used, over-front operations

• Main winch line speed (high – low)	4 levels	126 – 65 m/min
• Auxiliary winch line speed (high – low)	2 levels	107 – 55 m/min
• Time taken to raise boom (0° – 83°)		45 sec
• Time taken to extend boom (9.5 m – 30.5 m)		75 sec
• Travel speed	High range (2WD/4WD)	0 – 49 km/h (0 – 30.43 MPH)
	Low range (4WD)	0 – 19 km/h (0 – 11.80 MPH)
• Min. turning radius	2-wheel steering	9.0 m (29.52 ft)
	4-wheel steering	5.3 m (17.38 ft)

Weight

• Operating weight (not including operator)	27470 kg (60571 lb)

Boom

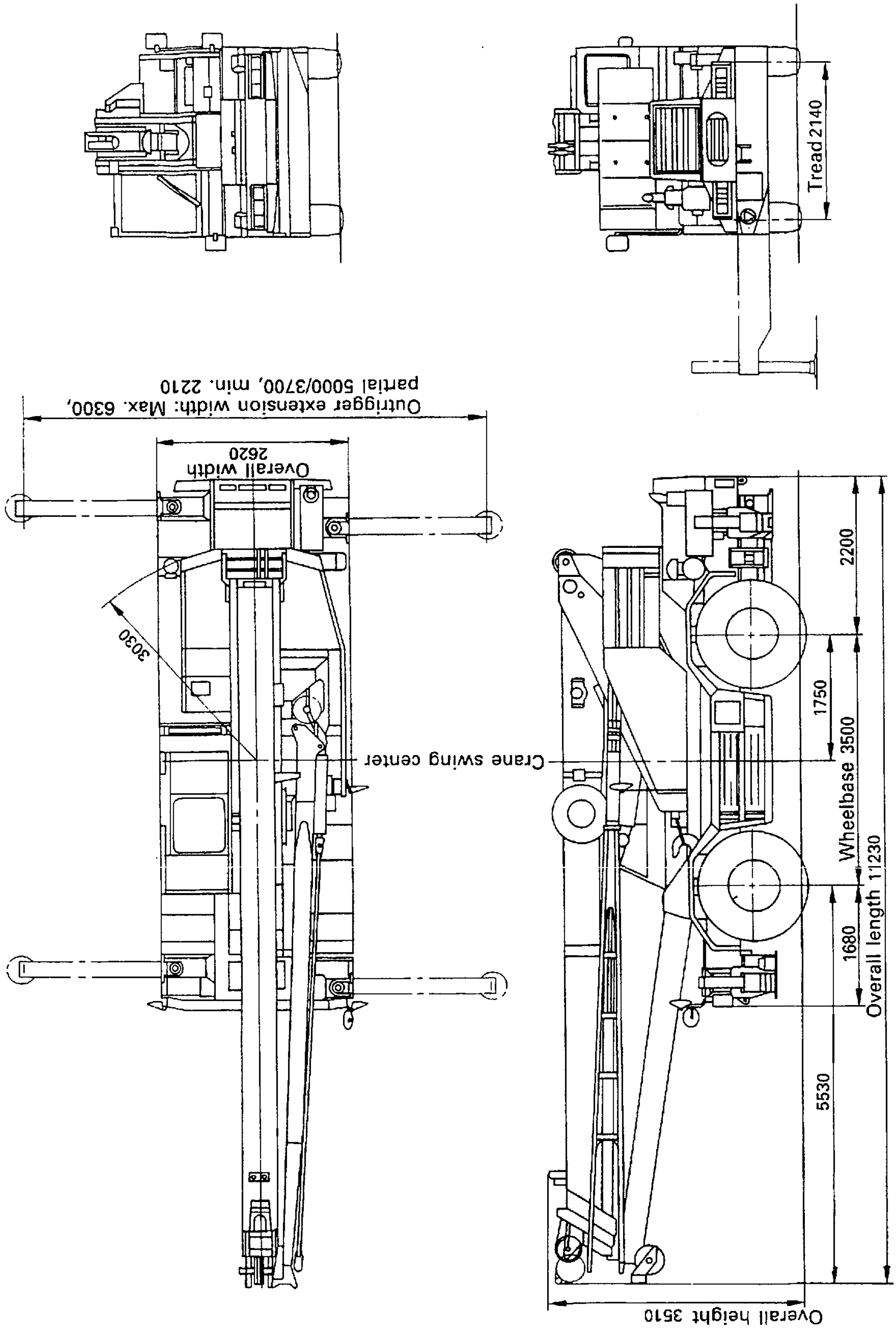
• Boom length	8.9 m – 28.5 m (29.19 ft – 93.48 ft)	
• Wire rope dimensions	Main winch	ø16 mm (0.63 in) x 170 m (557.6 ft)
	Auxiliary winch	ø16 mm (0.63 in) x 95 m (311.6 ft)
• Type of rope	JIS No. 18 7x7+6xFi(29) B type, normal Z lay	

Engine

• Type	Komatsu S6D125 diesel engine
• Rated horsepower	162 kW (217 HP)/2100 rpm
• Max. torque	96 kgm (694 lbft)/1300 rpm
• Starting motor	24 V 7.5 kW
• Alternator	24 V 50 A
• Battery	12 V 120 Ah x 2

Tire

• Size	Front wheel	16.00 R25 ☆☆
	Rear wheel	16.00 R25 ☆☆


Tread 2140
Outrigger extension width: Max. 6300,
partial 5000/3700, min. 2210
Overall width
2620
3030
Crane swing center
2200
1750
Wheelbase 3500
1680
Overall length 11230
5530
Overall height 3510

LW250-3
[Machines with equipped with X-shaped outrigger]

Performance

	Boom length	Capacity	Conditions
• Crane capacity	9.5 m (31.16 ft)	26.0 t x 3.5 m (11.48 ft)	Outrigger fully extended, 360° operations
	16.5 m (54.12 ft)	19.0 t x 4.0 m (13.12 ft)	
	23.5 m (77.08 ft)	12.5 t x 5.0 m (16.4 ft)	
	30.5 m (100.04 ft)	7.0 t x 8.0 m (26.24 ft)	
	9.5 m (31.16 ft)	9.0 t x 3.0 m (9.84 ft)	Outrigger not used, 360° operations
	9.5 m (31.16 ft)	14.0 t x 3.5 m (11.48 ft)	Outrigger not used, over-front operations

• Main winch line speed (high – low)	4 levels	126 – 65 m/min
• Auxiliary winch line speed (high – low)	2 levels	107 – 55 m/min
• Time taken to raise boom (0° – 83°)		45 sec
• Time taken to extend boom (8.9 m – 28.5 m)		75 sec
• Travel speed	High range (2WD/4WD)	0 – 49 km/h (0 – 30.43 MPH)
	Low range (4WD)	0 – 19 km/h (0 – 11.80 MPH)
• Min. turning radius	2-wheel steering	9.0 m (29.52 ft)
	4-wheel steering	5.3 m (17.38 ft)

Weight

• Operating weight (not including operator)	27740 kg (61167 lb)

Boom

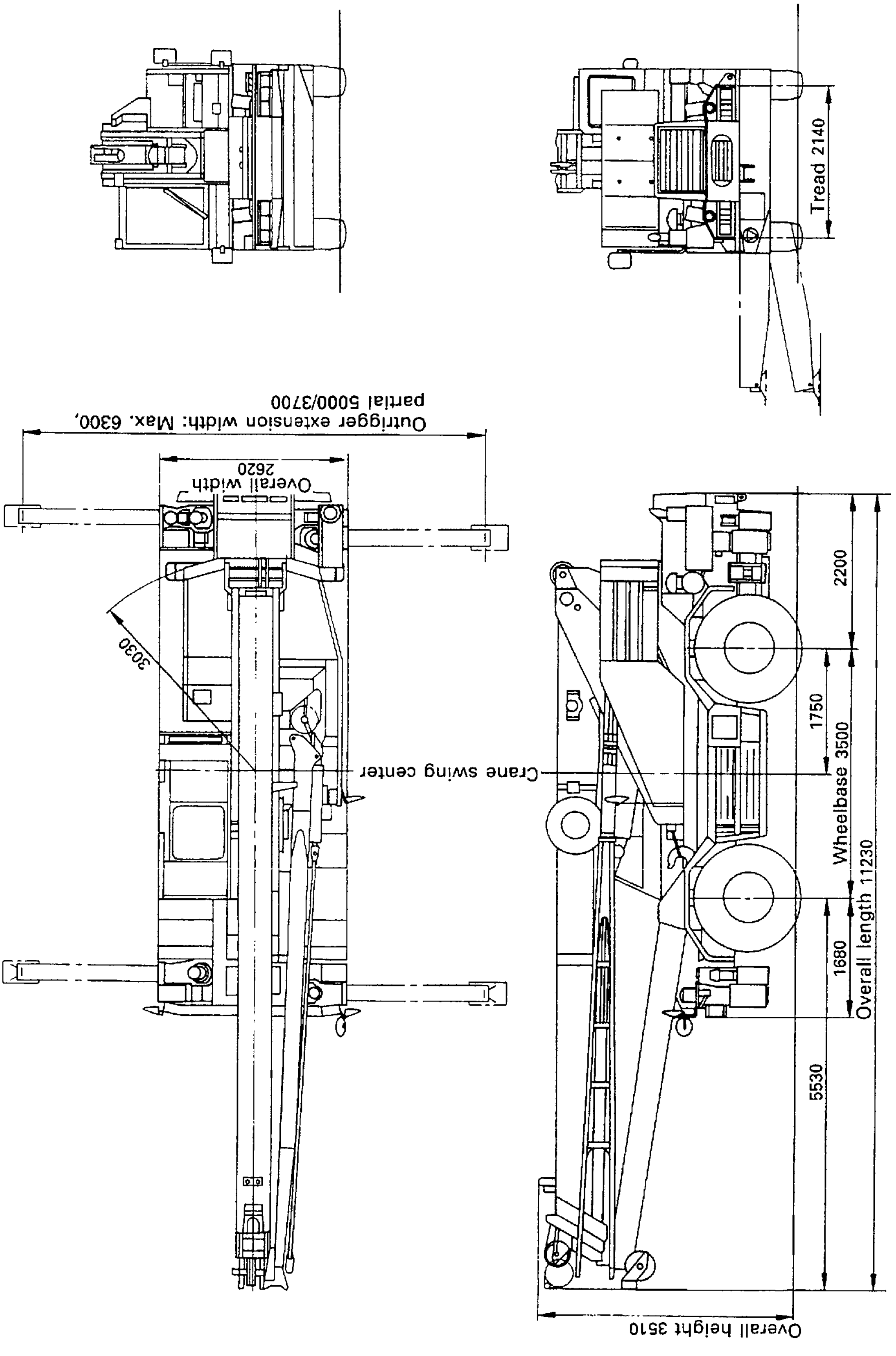
• Boom length	9.5 m – 30.5 m (31.16 ft – 100.04 ft)	
• Wire rope dimensions	Main winch	ø16 mm (0.63 in) x 170 m (557.6 ft)
	Auxiliary winch	ø16 mm (0.63 in) x 95 m (311.6 ft)
• Type of rope	JIS No. 18 7x7+6xFi(29) B type, normal Z lay	

Engine

• Type	Komatsu S6D125 diesel engine
• Rated horsepower	162 kW (217 HP)/2100 rpm
• Max. torque	96 kgm (694 lbft)/1300 rpm
• Starting motor	24 V 7.5 kW
• Alternator	24 V 50 A
• Battery	12 V 120 Ah x 2

Tire

• Size	Front wheel	16.00 R25 ☆☆
	Rear wheel	16.00 R25 ☆☆


Tread 2140
Outrigger extension width: Max. 6300,
partial 5000/3700
Overall width
2620
3030
Crane swing center
2200
1750
Wheelbase 3500
1680
Overall length 11230
5530
Overall height 3510

RATED OVERALL LOAD TABLE

- Main jib operations with outriggers set

Main jib length (m) Working radius (m)	Outriggers fully extended				Outriggers partially extended (5.0m)			
	9.5	16.5	23.5	30.5	9.5	16.5	23.5	30.5
2.5	26.0	19.00	12.50		26.00	19.00	12.50	
3.0	26.0	19.00	12.50		26.00	19.00	12.50	
3.5	25.0	19.00	12.50	7.0	25.00	19.00	12.50	7.0
4.0	23.0	19.00	12.50	7.0	23.00	19.00	12.50	7.0
4.5	21.20	18.00	12.50	7.0	21.20	18.00	12.50	7.0
5.0	19.40	16.70	12.50	7.0	18.40	16.70	12.50	7.00
5.5	17.80	15.60	11.75	7.0	15.40	15.00	11.75	7.00
6.0	16.30	14.60	11.10	7.0	13.00	12.60	11.10	7.00
6.5	15.10	13.80	10.50	7.0	11.20	10.80	10.50	7.00
7.0	13.70	13.00	10.00	7.0	9.50	9.40	10.00	7.00
8.0		10.90	9.00	7.0		7.30	8.00	7.00
9.0		8.65	8.20	6.30		5.85	6.50	6.30
10.0		7.05	7.30	5.80		4.75	5.40	5.60
11.0		5.85	6.40	5.30		3.90	4.55	4.80
12.0		4.95	5.50	4.90		3.30	3.85	4.15
13.0		4.20	4.75	4.50		2.75	3.30	3.55
14.0		3.60	4.10	4.15		2.30	2.85	3.10
15.0			3.60	3.80			2.45	2.70
16.0			3.15	3.45			2.10	2.40
17.0			2.80	3.05			1.80	2.10
18.0			2.45	2.70			1.55	1.80
19.0			2.15	2.45			1.35	1.60
20.0			1.90	2.20			1.15	1.40
21.0			1.70	1.95			0.95	1.20
22.0				1.75				1.05
24.0				1.40				0.75
26.0				1.15				0.50
28.0				0.95				
Danger angle	—	—	—	—	—	—	—	—

The above table is based on the actual working radius including the deflection of the boom and jib. The values given are the values when the outriggers are extended and set on firm, horizontal ground. The values above the bold line are the values based on the strength of the crane; the values below the bold line are based on the stability of the crane.

Main jib length(m) Working radius(m)	Outriggers partially extended (3.7m)				Minimum extension of outriggers (H-shaped type only)			
	9.5	16.5	23.5	30.5	9.5	16.5	23.5	30.5
2.5	26.0	19.00	12.50		12.00	11.60		
3.0	26.0	19.00	12.50		12.00	11.60	9.70	
3.5	20.50	19.00	12.50	7.0	9.35	8.95	9.70	5.50
4.0	16.00	15.70	12.50	7.0	7.55	7.15	7.80	5.50
4.5	12.80	12.65	12.50	7.0	6.20	5.80	6.45	5.50
5.0	10.70	10.50	11.00	7.00	5.15	4.80	5.40	5.50
5.5	9.05	8.80	9.40	7.00	4.35	4.00	4.60	4.75
6.0	7.70	7.60	8.20	7.00	3.70	3.40	3.95	4.15
6.5	6.60	6.55	7.25	7.00	3.15	2.85	3.40	3.65
7.0	5.80	5.65	6.40	6.55		2.40	2.95	3.20
8.0		4.40	5.05	5.30		1.70	2.25	2.50
9.0		3.50	4.05	4.35		1.10	1.75	1.95
10.0		2.80	3.30	3.65		0.65	1.35	1.55
11.0		2.15	2.75	3.05			0.95	1.20
12.0		1.70	2.30	2.60				0.90
13.0		1.30	1.90	2.20				
14.0		1.00	1.60	1.85				
15.0			1.35	1.55				
16.0			1.10	1.30				
17.0			0.90	1.10				
18.0			0.70	0.90				
19.0			0.50	0.70				
20.0				0.55				
21.0								
22.0								
24.0								
26.0								
28.0								
Danger angle	—	—	20°	40°	—	40°	53°	60°

The above table is based on the actual working radius including the deflection of the boom and jib. The values given are the values when the outriggers are extended and set on firm, horizontal ground. The values above the bold line are the values based on the strength of the crane; the values below the bold line are based on the stability of the crane.

- Main jib operations with outriggers not used (machine stationary)

Main jib length (m) Working radius (m)	Over-front			360°		
	9.5	16.5	23.5	9.5	16.5	23.5
3.0	14.00	9.00		9.00	7.30	
3.5	14.00	9.00	6.50	7.60	7.30	4.50
4.0	12.50	9.00	6.50	6.30	5.85	4.50
4.5	10.90	9.00	6.50	5.20	4.75	4.50
5.0	9.55	8.20	6.50	4.30	4.00	4.30
5.5	8.30	7.40	6.10	3.60	3.30	3.70
6.0	7.20	6.60	5.65	3.00	2.80	3.20
6.5	6.25	5.90	5.25	2.50	2.35	2.75
7.0	5.20	5.25	4.85	2.00	1.95	2.40
8.0		4.10	4.10		1.40	1.80
9.0		3.25	3.50		0.95	1.40
10.0		2.60	3.00		0.60	1.05
11.0		2.10	2.55			0.75
12.0		1.70	2.20			
13.0		1.35	1.85			
14.0		1.00	1.55			
15.0			1.30			
16.0			1.05			
17.0			0.85			
18.0			0.65			
19.0			0.50			
20.0						
Danger angle	—	—	—	—	40°	53°

The above table is based on the actual working radius including the deflection of the boom and jib. The values above the bold line are the values based on the strength of the crane; the values below the bold line are based on the stability of the crane.

- Main jib operations with outriggers not used (machine traveling at max speed of 1.6 km/h)

Main jib length(m)	Over-front			360°		
Working radius (m)	9.5	16.5	23.5	9.5	16.5	23.5
3.0	10.50	7.50		7.00	5.10	
3.5	10.50	7.50	5.50	6.20	5.10	3.20
4.0	9.50	7.50	5.50	5.30	4.90	3.20
4.5	8.70	7.50	5.50	4.40	3.95	3.20
5.0	8.00	7.00	5.50	3.60	3.30	3.20
5.5	6.90	6.20	5.15	3.00	2.70	3.10
6.0	5.90	5.50	4.80	2.50	2.30	2.70
6.5	5.10	4.90	4.45	2.10	1.90	2.30
7.0	4.30	4.35	4.15	1.70	1.60	2.00
8.0		3.40	3.50		1.10	1.50
9.0		2.70	2.95		0.70	1.10
10.0		2.15	2.45			0.80
11.0		1.70	2.05			0.60
12.0		1.35	1.70			
13.0		1.10	1.45			
14.0		0.80	1.20			
15.0			1.00			
16.0			0.85			
17.0			0.70			
18.0			0.55			
19.0						
20.0						
Danger angle	—	—	30°	—	45°	54°

The above table is based on the actual working radius including the deflection of the boom and jib. The values above the bold line are the values based on the strength of the crane; the values below the bold line are based on the stability of the crane.

- Auxiliary jib operations with outriggers set (power tilt specification machines)

Outriggers fully extended									
Boom angle (°)	7.8m				Boom angle (°)	12.8m			
	Tilt 5°	Tilt 25°	Tilt 45°	Tilt 60°		Tilt 5°	Tilt 25°	Tilt 45°	Tilt 60°
83.0	3.00	2.10	1.60	1.00	83.0	2.00	1.25	0.80	0.50
76.0	3.00	2.10	1.60	1.00	76.0	2.00	1.20	0.80	0.50
71.5	3.00	2.10	1.60	1.00	75.0	2.00	1.15	0.80	0.50
70.0	2.90	2.10	1.60	0.95	72.0	1.75	1.10	0.80	0.49
65.0	2.50	1.90	1.50	0.90	70.0	1.65	1.05	0.80	0.48
60.0	2.10	1.65	1.35	0.80	65.0	1.40	0.95	0.78	0.47
55.0	1.50	1.35	1.20		60.0	1.20	0.90	0.75	0.45
50.0	1.05	1.00	0.95		55.0	1.10	0.85	0.74	
45.0	0.75	0.70	0.70		50.0	0.85	0.75	0.70	
40.0	0.50	0.50			45.0	0.60	0.55	0.55	
35.0	0.40	0.35			40.0	0.45	0.40		
Danger angle	33°	33°	43°	58°	Danger angle	38°	38°	43°	58°

Outrigger partially extended (5.0 m)									
Boom angle (°)	7.8m				Boom angle (°)	12.8m			
	Tilt 5°	Tilt 25°	Tilt 45°	Tilt 60°		Tilt 5°	Tilt 25°	Tilt 45°	Tilt 60°
83.0	3.00	2.10	1.60	1.00	83.0	2.00	1.25	0.80	0.50
76.0	3.00	2.10	1.60	1.00	76.0	2.00	1.20	0.80	0.50
71.5	3.00	2.10	1.60	0.95	72.0	1.75	1.10	0.80	0.49
70.0	2.90	2.10	1.60	0.94	70.0	1.65	1.05	0.80	0.48
65.0	2.10	1.80	1.50	0.85	65.0	1.40	0.95	0.78	0.43
60.0	1.40	1.20	1.10	0.75	60.0	1.00	0.90	0.75	0.40
55.0	0.85	0.75	0.75		55.0	0.70	0.60	0.50	
50.0	0.50	0.45	0.45		50.0	0.40	0.35	0.35	
Danger angle	48°	48°	48°	58°	Danger angle	48°	48°	48°	58°

Outrigger partially extended (3.7 m)									
Boom angle (°)	7.8m				Boom angle (°)	12.8m			
	Tilt 5°	Tilt 25°	Tilt 45°	Tilt 60°		Tilt 5°	Tilt 25°	Tilt 45°	Tilt 60°
83.0	3.00	2.10	1.60	1.00	83.0	2.00	1.25	0.80	0.50
76.0	3.00	2.10	1.60	1.00	76.0	2.00	1.20	0.80	0.50
71.5	2.35	1.90	1.55	0.95	72.0	1.75	1.10	0.80	0.46
70.0	2.00	1.65	1.40	0.92	70.0	1.50	1.05	0.80	0.45
65.0	1.20	0.95	0.90		65.0	0.80	0.65	0.55	
60.0	0.55	0.50	0.45		60.0	0.45	0.35	0.31	
Danger angle	58°	58°	58°	68°	Danger angle	58°	58°	58°	68°

(Manual jib specification machines)

Outriggers fully extended

Boom angle (°)	7.8m			Boom angle (°)	12.8m		
	Tilt 5°	Tilt 25°	Tilt 45°		Tilt 5°	Tilt 25°	Tilt 45°
83.0	3.00	2.10	1.60	83.0	2.00	1.25	0.80
76.0	3.00	2.10	1.60	76.0	2.00	1.20	0.80
71.5	3.00	2.10	1.60	75.0	2.00	1.15	0.80
70.0	2.90	2.10	1.60	72.0	1.75	1.10	0.80
65.0	2.50	1.90	1.50	70.0	1.65	1.05	0.80
60.0	2.10	1.65	1.35	65.0	1.40	0.95	0.78
55.0	1.50	1.35	1.20	60.0	1.20	0.90	0.75
50.0	1.10	1.05	1.00	55.0	1.10	0.85	0.74
45.0	0.80	0.80	0.75	50.0	0.85	0.75	0.70
40.0	0.60	0.55		45.0	0.65	0.65	0.60
35.0	0.45	0.40		40.0	0.45	0.45	
30.0	0.30			35.0	0.30	0.30	
Danger angle	28°	33°	43°	Danger angle	33°	33°	43°

Outrigger partially extended (5.0 m)

Boom angle (°)	7.8m			Boom angle (°)	12.8m		
	Tilt 5°	Tilt 25°	Tilt 45°		Tilt 5°	Tilt 25°	Tilt 45°
83.0	3.00	2.10	1.60	83.0	2.00	1.25	0.80
76.0	3.00	2.10	1.60	76.0	2.00	1.20	0.80
71.5	3.00	2.10	1.60	72.0	1.75	1.10	0.80
70.0	2.90	2.10	1.60	70.0	1.65	1.05	0.80
65.0	2.10	1.80	1.50	65.0	1.40	0.95	0.78
60.0	1.40	1.20	1.15	60.0	1.00	0.90	0.75
55.0	0.85	0.80	0.80	55.0	0.70	0.60	0.55
50.0	0.55	0.50	0.50	50.0	0.40	0.35	0.35
Danger angle	48°	48°	48°	Danger angle	48°	48°	48°

Outrigger partially extended (3.7 m)

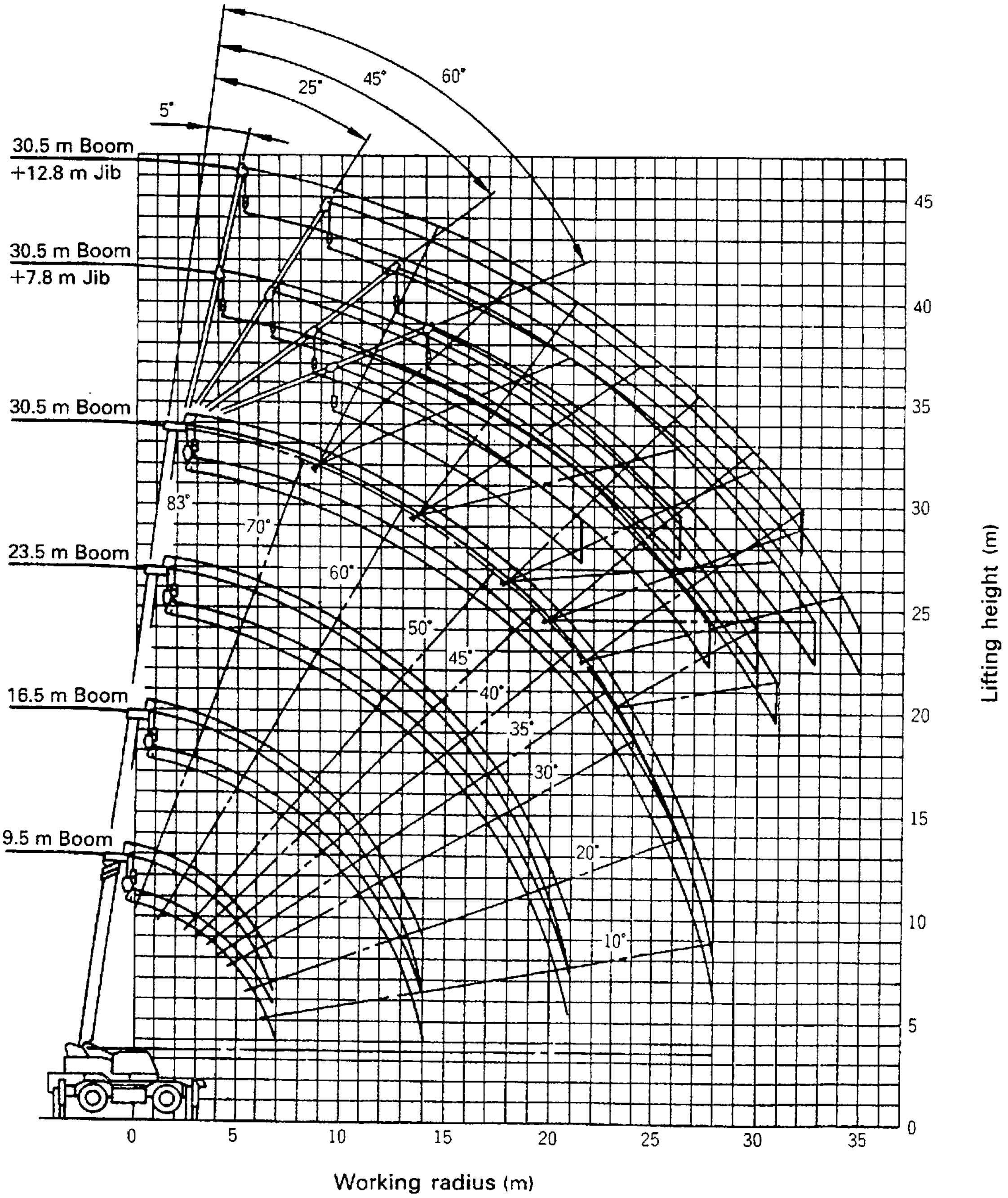
Boom angle (°)	7.8m			Boom angle (°)	12.8m		
	Tilt 5°	Tilt 25°	Tilt 45°		Tilt 5°	Tilt 25°	Tilt 45°
83.0	3.00	2.10	1.60	83.0	2.00	1.25	0.80
76.0	3.00	2.10	1.60	76.0	2.00	1.20	0.80
71.5	2.35	1.90	1.55	72.0	1.75	1.10	0.80
70.0	2.00	1.65	1.40	70.0	1.50	1.05	0.80
65.0	1.20	0.95	0.90	65.0	0.80	0.65	0.55
60.0	0.55	0.50	0.45	60.0	0.45	0.35	0.31
Danger angle	58°	58°	58°	Danger angle	58°	58°	58°

Working radius/lifting height chart

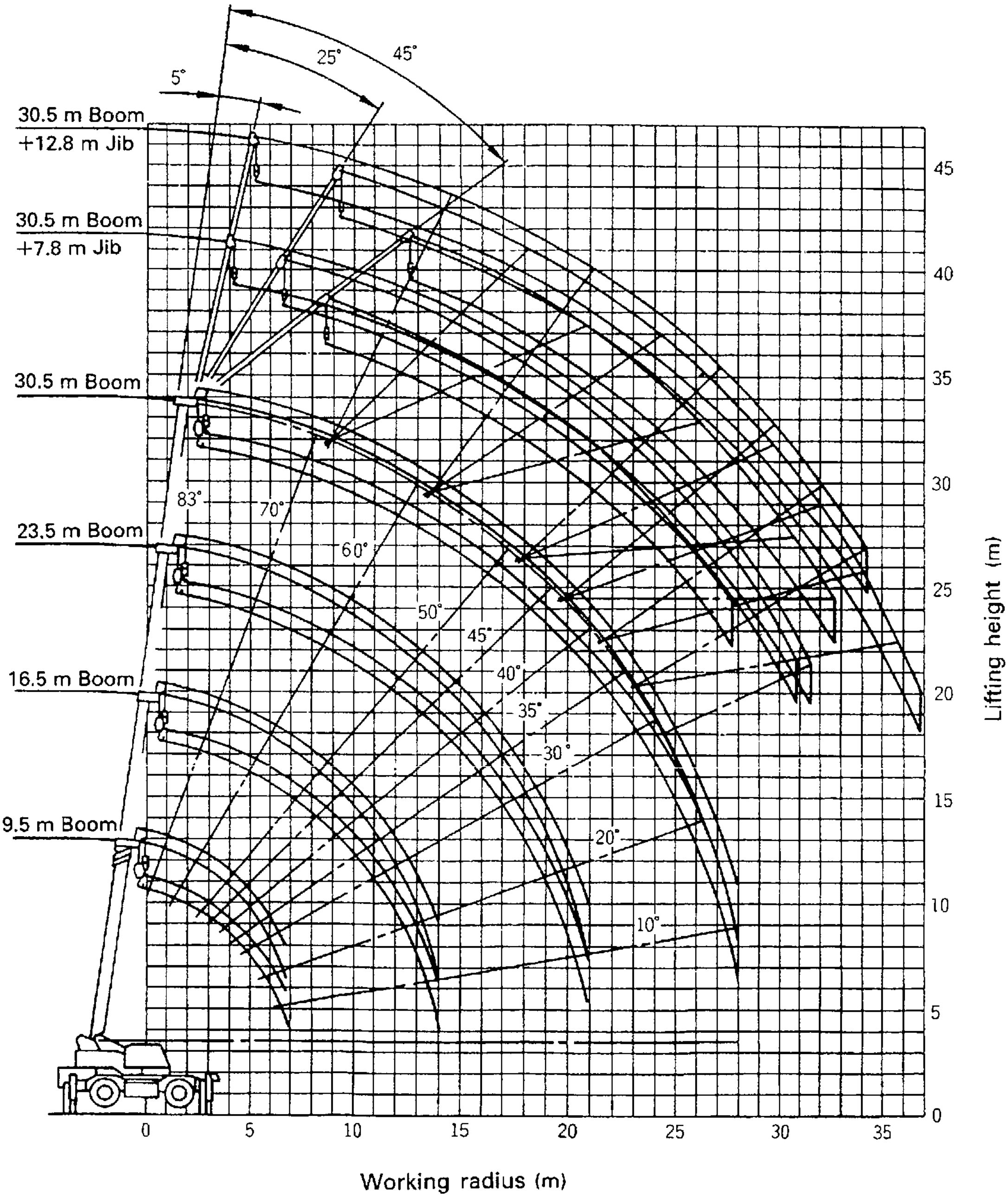
The chart below shows the relationship between the operating radius and lifting height when the outriggers are fullyextended

The value given does not include the deflection of the boom and jib.

- Power tilt jib specification machines



- Manual jib specification machines



OPERATIONS WITH ATTACHMENTS

This section contains only explanations of operations with attachments (vibro, drop hammer, auger, etc.) which are different from normal operations.

25. OPERATIONS WITH ATTACHMENTS

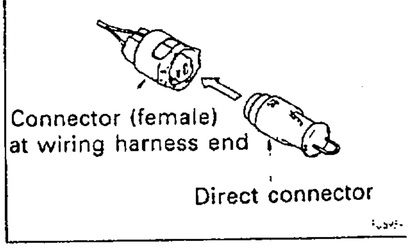
When carrying out operations with attachments, the procedure for operation is different from normal crane operations, so always keep to the following precautions.

- When carrying out operations with attachments when the leader is not installed (such as the vibro hammer), keep the boom length to a maximum of 23.5 m (length of 3rd stage boom).

- When carrying out operations with attachments when the leader is installed (such as the drop hammer and auger), secure the top boom with the lock pin (option) and change the telescope method by canceling the function which uses wire rope to extend and retract the top boom.

When securing the top boom and 3rd boom with the top boom lock pin (option), always cancel the top boom telescope function of the wire rope, then carry out the telescoping operation of the three-stage boom.

- When carrying out operations with attachments (vibro, drop hammer, auger, etc.), remove the overwind detection switch and detection weight.
  After removing the overwind detection switch, connect the direct connector to the connector (female) at the wiring harness end. Do not allow the connector to swing.

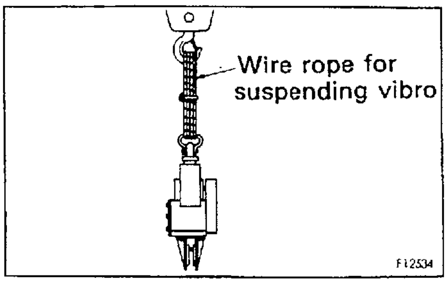


- Make sure that you know the exact weight of the attachment being used, and carry out operations safely within the rated overall load. Consider the vibration and impact load also.

- When handling the vibro hammer, drop hammer, or auger, always follow the instructions in the attachment operation manual.

- Before starting operations, always check the following items first, and check that there is no abnormality.
  - Check for loose or missing parts (bolts, nuts) at the mounts.
  - Check for deformation or cracks in the welds.
  - Check for wear, deformation, or cracks in the lifting equipment (wire rope, end of wire, hook block)
  - Check for any oil leakage from the hydraulic equipment or piping.
  - Check the operating condition of the components and equipment.

- Prevent the vibration from being transmitted directly to the hook. When carrying out operations with the vibro hammer, operations are more effective if the hook and vibro are suspended with the wire rope.



- Do not apply any load greater than the capacity of the hook. When carrying out operations with the vibro hammer, take the exciting force into consideration. In particular, when removing steel piles, be careful if the vibration method used for pulling out transmits vibration directly to the hool, such as when the spring of the damper device (shock absorber) is in tight contact, because a load equivalent to the exciting force is applied to the hook.

- Remove the attachments when traveling.

26. HANDLING LEADER

The leader is used to carry out pile-driving operations smoothly. Use it for operations with the drop hammer and earth auger. (Length of leader: Approx. 15 m)

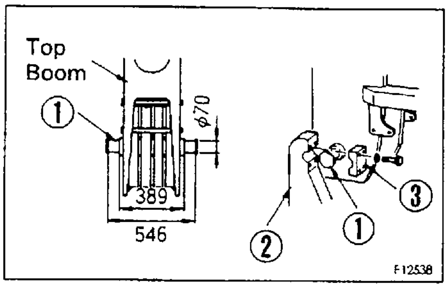
Precautions when using

- Keep strictly to the precautions applying to operations with attachments when carrying out operations.
- Coat the leader guide thoroughly with grease.
- Check that the attachment moves smoothly up and down along the leader guide.
- Position the leader in the place for driving the pile, and dig the claws of the bracket installed to the bottom end into the ground surface.
- Always keep the leader perpendicular.

Installing leader

After assembling the leader and bracket on the ground, install bracket ② to long pin ① of the bottom sheave at the tip of the top boom, then secure it with holder plate ③ and the bolt.

Make bracket ② and holder plate ③ at the customer's end to match the size of the long pin.



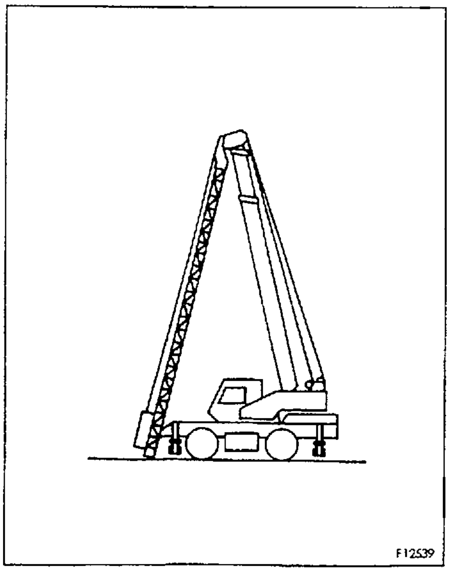
Moving

When moving to the next working place with the attachment still suspended, always use the following procedure.

1. Raise the boom and fix the leader to the front bumper on the chassis frame.Make the boom as short as possible, then lower the attachment to the bottom tip of the leader.

2. Apply the swing brake.

3. Before retracting the jacks, check that the spring lock is applied.If it is not applied, carry out the spring lock operation.



4. To ensure safety when traveling, do not retract the jacks fully. Retract them enough so that they do not cause any obstruction when traveling.
   Keep the slides extended.

5. When traveling, always keep to a maximum speed of 5 km/h, and travel in the L range or R range.

After moving, extend the outriggers and set the crane horizontal.

Precautions when carrying out pile-removing operation (removing boards)

- Always align the center of the leader with the center of the boom when carrying out this operation.
- Always release the swing lock brake. (To prevent overload on the boom and swing mechanism)